



**FINAL
SITE INVESTIGATION REPORT**

**ATTERBURY RESERVE FORCES TRAINING AREA
EDINBURGH, INDIANA
VOLUME I OF II**

**Contract No. DAHA90-94-D-0013
Delivery Order No. 502
Montgomery Watson File No. 4162.0200**

Prepared For:

**Military Department of Indiana
Indianapolis, Indiana**

Prepared By:

**Montgomery Watson
Novi, Michigan**

May 1997



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LIST OF ACRONYMS

°F	degrees Fahrenheit
bgs	below ground surface
BOD	biochemical oxygen demand
COD	chemical oxygen demand
DO	delivery order
DRO	diesel range organics
FORSCOM	United States Army Forces Command
FSP	Field Sampling Plan
ft	feet
gpm	gallons per minute
GRO	gasoline range organics
HSP	health and safety plan
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IGS	Indiana Geological Survey
MACOM	Major Command
MDI	Military Department of Indiana
NGB	National Guard Bureau
OC	organochlorinated
OP	organophosphorous
PA	Preliminary Assessment
PCBs	polychlorinated biphenyls
PMP	Project Management Plan
ppm	parts per million
QAPjP	quality assurance project plan
SI	site investigation
SVOC	semi-volatile organic compound
TAL	target analyte list

TPH	total petroleum hydrocarbons
USAEHA	United States Army Environmental Hygiene Agency
USDA SCS	United States Department of Agriculture Soil Conservation Service
VRP	Voluntary Remediation Program
VOC	volatile organic compound

EXECUTIVE SUMMARY

The Military Department of Indiana contracted Montgomery Watson to perform a limited site investigation at the Camp Atterbury Reserve Forces Training Area located in Edinburgh, Indiana. The work was performed under Contract No. DAHA90-94-D-0013, Delivery Order No. 502.

The site investigation included soil and groundwater quality assessment and characterization. Field activities were conducted at five previously identified areas of concern on site. These areas were the Battery Disposal Areas, Impact Area, Wash Rack Area, Wastewater Sludge Lagoon Area, and the Old Landfill Area. Activities included monitoring well installation and groundwater sampling to evaluate groundwater flow and quality in the Old Landfill Area, Battery Disposal Area, and Wastewater Sludge Lagoon Area. Soil borings were drilled and soil samples collected in the Battery Disposal Area, Wastewater Sludge Lagoon Area, and Wash Rack Area. Sediment samples were collected at the Impact Area, and soil/sludge samples were collected in the Wastewater Sludge Lagoon Area. Samples were analyzed for various constituents, based on the Preliminary Assessment and visual inspection of the site. Constituent concentrations from the samples were compared to Indiana Department of Environmental Management Voluntary Remediation Program Tier II Non-residential Cleanup Criteria, as specified by the Military Department of Indiana and agreed upon by the Indiana Department of Environmental Management. All laboratory data for this investigation was validated by qualified Montgomery Watson personnel and determined to be valid under specifications detailed in the Quality Assurance Program Plan (Montgomery Watson, April 1996).

No sample taken from any area exhibited concentrations exceeding Tier II Non-residential Cleanup Criteria. Shallow groundwater flow at the site is toward the east-southeast. Flow velocities are on the order of $1.9\text{E-}06$ feet per second. Hydraulic conductivities of the subsurface formations vary from 0.92 feet per day in the Battery Disposal Area to 20.4 feet per day in the eastern portion of Camp Atterbury.

It is the recommendation of Montgomery Watson that activities at Camp Atterbury Reserve Forces Training Area proceed directly into the execution of decision documents for each area of concern, as the constituents sampled for in each area were below Tier II Non-residential Cleanup Criteria.

1.0 INTRODUCTION

The Military Department of Indiana (MDI) has contracted Montgomery Watson to perform a site investigation (SI) at the Camp Atterbury Reserve Forces Training Area (Camp Atterbury) located in Edinburgh, Indiana (Figure 1). This work is being performed under Contract No. DAHA90-94-D-0013, Delivery Order (DO) No. 502.

Camp Atterbury is located in south central Indiana, approximately 35 miles south-southeast of Indianapolis, Indiana (Figure 1). The property consists of approximately 33,000 acres and lies in Bartholomew, Brown, and Johnson counties. Montgomery Watson prepared a Field Sampling Plan (FSP), a Project Management Plan (PMP), a Health and Safety Plan (HSP), and a Quality Assurance Project Plan (QAPjP) for this project. Copies of each plan were reviewed by both MDI and the Indiana Department of Environmental Management (IDEM). Correspondence between MDI, IDEM, and Montgomery Watson is referenced in Appendix A. The purpose of an SI is to further explore potential areas of concern identified in the preliminary environmental assessment of Camp Atterbury. Areas of concern were evaluated and specific locations, constituents, and sample matrices were selected. This report includes a description of the site investigation activities, a summary of the findings associated with these activities, and recommendations for future site activities.

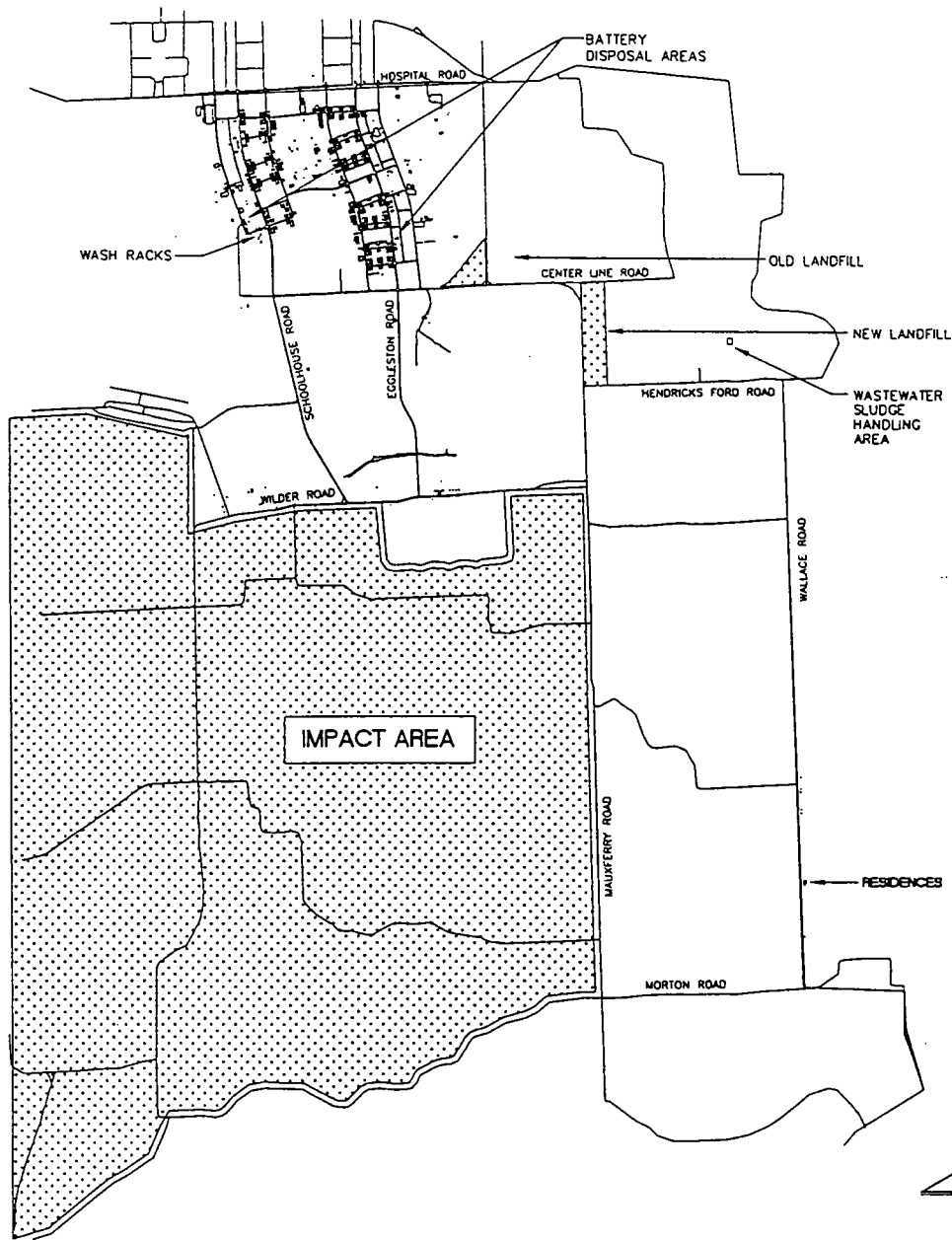
Section 2 of this report summarizes the Preliminary Assessment (PA) conducted at Camp Atterbury. Section 3 presents site investigation activities conducted by Montgomery Watson. Investigative results from these activities are presented in Section 4. Conclusions and recommendations are provided in Sections 5 and 6, respectively.

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2.0 PREVIOUS INVESTIGATIONS

In 1993, Roy F. Weston, Inc. (Weston) completed a PA for Camp Atterbury. The report identified several potential areas of concern at Camp Atterbury. Additionally, due to limited site specific hydrogeological information, the report called for a complete hydrogeological investigation of the facility, including groundwater velocity and flow direction (Weston, 1993). IDEM concurred with this report in a letter to Mr. John Orr of MDI dated July 18, 1995 (see Appendix A). IDEM also expressed concern about private municipal wells located south-southeast of Camp Atterbury, and possible impacts to the aquifer serving these wells. However, impacts to groundwater were not identified in wells existing near the eastern boundaries of Camp Atterbury prior to the site investigation activities.

As a result of the PA report, Montgomery Watson was tasked with performing environmental site investigations in five areas; the Impact Area, Battery Disposal Areas, Wastewater Sludge Lagoon Area, Old Landfill Area, and Wash Rack Area. These areas are depicted in Figure 2, and are further described in Section 3.



0 5000 10000
SCALE IN FEET

MILITARY DEPARTMENT OF INDIANA
CAMP ATTERBURY SITE INVESTIGATION
EDINBURGH, INDIANA

SITE MAP
AREAS OF CONCERN

FIGURE 2



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3.0 SITE INVESTIGATION ACTIVITIES

The following section provides a description of the history and current use of Camp Atterbury and provides a detail of the sampling activities conducted by Montgomery Watson at the site.

3.1 HISTORY AND CURRENT USE

Camp Atterbury covers approximately 33,000 acres in Johnson, Brown, and Bartholomew counties in south-central Indiana (United States Army Environmental Hygiene Agency [USAEHA], 1981). Camp Atterbury was established in 1942 as a training area for the United States Army, and is currently used as a site for military training exercises. The property north of Hospital Road, now the Atterbury State Fish and Wildlife Area, was part of Camp Atterbury until 1967.

Camp Atterbury is used as a weekend and annual training site for the National Guard. It provides both housing and training for units as large as a brigade with its normal division and corps-supporting elements. Several ranges for a variety of weapons, including aircraft bombing, artillery, flame throwers, grenades, helicopter gunnery, mortars, machine guns, rifles, and pistols, are located at the facility (Weston, 1993). A gunnery range used by the Army National Guard is also located at the camp (United States Department of Agriculture Soil Conservation Service [USDA SCS], 1990).

Between 1969 and 1984, Camp Atterbury was operated by the MDI under the National Guard Bureau (NGB), and was a subpost of Fort Benjamin Harrison. In October 1984, Camp Atterbury became a separate, stand-alone installation under the U.S. Army Forces Command (FORSCOM) with the NGB remaining the peacetime Major Command (MACOM) (Weston, 1993).

Camp Atterbury is located approximately 35 miles south-southeast of Indianapolis, west of U.S. 31 and Interstate 65, and north of State Route 46 (Figure 1). Although most of the facility is in western Bartholomew County, the western edge of the facility is in Brown County, and the northern portion is in Johnson County. Approximately 45 percent of the Camp Atterbury

property is forested (primarily west and south) and approximately 45 percent supports native grasses and weeds (USDA SCS, 1990).

Population centers close to Camp Atterbury are generally located to the north, east, or south in Johnson and Bartholomew Counties; the rugged terrain in western Bartholomew County and eastern Brown County has limited access and settlement. Surrounding population centers include the Prince's Lake and Cordry Lake areas to the west, Edinburgh to the northeast, Taylorsville to the east, and Columbus to the southeast.

Land use in Johnson County is increasingly moving away from farming toward more urban uses as Indianapolis and its suburbs expand outward (USDA SCS, 1979). Farming is one of the major businesses in Bartholomew County; in 1969, 71 percent of the county was farmland according to a U.S. Census of Agriculture (USDA SCS, 1992). Because of the generally steep slopes, most of Brown County is not suitable for cultivated crops and remains forested. Approximately 50 percent of Brown County is owned by federal and state governments (USDA SCS, 1990).

3.1.1 Climate

The climate in the vicinity of Camp Atterbury is influenced by its midcontinental setting, which results in cold winters and hot summers. It is located on the edge of the area influenced by the Great Lakes. Generally, the weather is variable, changing frequently with the passage of cool Canadian air masses from the north, and warmer, more humid tropical air masses from the south. Based on climatic data collected between 1951 and 1974 at Columbus, Indiana, the average winter temperature is 32 degrees Fahrenheit (°F), and the average summer temperature is 75°F. The average total annual precipitation is 40.2 inches, of which approximately 57 percent occurs during summer months (April through September). (USDA SCS, 1992, 1990, 1979)

3.1.2 Topography

The land surface at Camp Atterbury ranges from relatively flat in the north to steep hills in the south. The north and northeast portion is relatively flat with scattered trees. This portion of Camp Atterbury is located in the region denoted as the Scottsburg Lowland. The Scottsburg

Lowland is a nearly level terrain comprising gently sloping river terraces and outwash plains, as well as the mostly level bottomland along Sugar Creek and Blue River (USDA SCS, 1979).

The central and southern parts of Camp Atterbury are rugged and generally heavily wooded, with deeply incised streams (Indiana Department of Natural Resources [IDNR], Division of Water, 1966). This portion of Camp Atterbury is located on the Norman Upland. The Norman Upland terrain is a severely dissected plain consisting of long, narrow ridges, steep slopes, and narrow stream bottoms. The bedrock is generally siltstone, shale, and sandstone of Mississippian age (USDA SCS, 1990).

An ongoing groundwater monitoring program is underway at the New Landfill. The five wells are sampled semi-annually and analytical results are reported to IDEM (McWhorter, 1995). During the SI, water levels were measured at the five existing wells, as well as the nine newly installed wells.

3.1.3 Geology

Camp Atterbury is located near the southern extent of the Pleistocene continental ice sheets. As the glaciers retreated, masses of material (clay, silt, sand, and gravel) which had accumulated on and in the ice were deposited on the bedrock surface. Glacial meltwaters in Sugar Creek and the East Fork of the White River carved broad stream valleys and later filled them with sand and gravel deposits (IDNR, Division of Water, 1966). The northern third of Camp Atterbury is underlain by Wisconsin age glacial deposits. Deposits of Illinoian age underlie the south-central portion of the facility. To the west and south, unglaciated soils lie atop the local bedrock (USDA SCS, 1990). Unconsolidated deposits range in thickness from 100 to 150 feet (ft) in the glaciated, northeastern third of the facility, to 0 ft in parts of the unglaciated southwestern portions of Camp Atterbury (Indiana Geological Survey [IGS], 1983).

The bedrock formations underlying Camp Atterbury are layered shale, siltstone, and limestone of Mississippian and Devonian age which dip gently to the west. In the central and western part of Camp Atterbury, the Mississippian age Borden Group shale, siltstones, and fine-grained sandstones lie at the surface. The Borden Group ranges in thickness from 0 ft in the northeast

corner of the facility to more than 200 ft in the Norman Upland to the south and west (IGS, 1972). In the northeastern portion of the facility, bedrock consists of Devonian and Mississippian age New Albany shale which underlies the area now occupied by the East Fork of the White River and some of its tributaries (Sugar Creek and the northern part of the Driftwood River valley) (IGS, 1972). The thickness of the New Albany shale is 100 to 110 ft in the Camp Atterbury area. Between 40 and 125 ft of Devonian limestone underlies the New Albany shale (IGS, 1972).

3.1.4 Hydrogeology

The nature and availability of groundwater is associated with the nature and type of aquifer materials present in the area. The Mississippian and Devonian bedrock which underlies Camp Atterbury yields only limited quantities of water (IDNR, 1980). The deposits of the Borden group, which outcrop across the southwestern two-thirds of the facility, are reportedly some of the poorest water-bearing formations in the state. The New Albany Shale and underlying Devonian limestone are expected to yield less than 10 gallons per minute (gpm). Many ponds have been built in the unglaciated region to supply local residential and agricultural needs. The major groundwater sources in the area are in the sand and gravel deposits of the East Fork of the White River valley. Well yields from this aquifer system, which extends from Edinburgh to Columbus, commonly exceed 1,000 gpm (IDNR, 1980). Personnel at Camp Atterbury indicate that attempts to install fire suppression water wells in the southern portion of the facility have been unsuccessful, and that groundwater was not encountered above approximately 200 ft below ground surface (bgs) (McWhorter, 1995).

Well records in the vicinity of the installation indicate a general east-southeast direction of groundwater flow (Weston, 1993). Water levels measured at five monitoring wells near the New Landfill suggest a more south-southeast direction of flow. The shallow depth to water in the valley fill aquifer to the east of Camp Atterbury suggests hydraulic connection between the groundwater and surface water (Weston, 1993; IDNR, 1976). Recharge to groundwater occurs from both the local fluvial system and from direct precipitation. Net monthly precipitation at Camp Atterbury was previously estimated to be three inches (Weston, 1993). Hydraulic communication between groundwater in the valley fill and in the underlying bedrock via fractures

and joints is likely. Recharge to the bedrock may occur via infiltration through both glacial and fluvial overburden (Weston, 1993)

Potable water for the city of Edinburgh is supplied by Edinburgh Utilities from four wells producing up to 1,000 gpm from a thick gravel aquifer in the Blue River valley at the north edge of town (Weston, 1993; IDNR, 1966). The wells are screened between approximately 100 and 120 ft bgs (Weston, 1993). The area surrounding Edinburgh is supplied by private wells (Phillips, 1995). In 1966, the well field for Camp Atterbury consisted of nine wells along the west side of the Blue River, north of Edinburgh. The wells ranged in depth from 66 to 112 ft bgs and were completed in gravel. Capacities of up to 2,000 gpm were obtained (IDNR, 1966). Today, Prince's Lakes Utilities uses these wells to provide water to the population of Camp Atterbury, the city of Nineveh, the Prince's Lake Area, and the Cordry/Sweetwater area. Eastern Bartholomew Utilities also supplies water to the eastern half of Bartholomew County and western Jennings County with two wells (screened between 115 and 135 ft bgs) within two to three miles of Camp Atterbury (Weston, 1993).

3.1.5 Surface Water Hydrology

In general, surface water at Camp Atterbury flows to the east along numerous small drainages and streams which are entrenched in the unglaciated soils and bedrock, and in glaciated soils and till. The area is drained by streams such as Nineveh Creek, Muddy Branch Creek, Saddle Creek, Lick Creek Catherine Creek, and their tributaries. These streams in turn flow into Sugar Creek and the Driftwood River, which joins the Flatrock River in Columbus to form the East Fork of the White River (USDA SCS, 1979). The East Fork of the Salt Creek and its tributaries drain to the west from the southwestern edge of Camp Atterbury. There are also several small lakes, both on Camp Atterbury property, and just west of the facility in Brown County (Cordry Lake and the Prince's Lake Area). A stream gauging station is located in Sugar Creek in Edinburgh, downstream from Youngs Creek, and the 22-year average flow is 485 cubic ft per second (IDNR, 1966).

The five areas which were investigated during the SI are illustrated on Figure 2. Two of these areas (the Impact Area and the Old Landfill) are located within the eastern portion of the facility,

near Wallace Road. Also within the eastern portion of the facility is the New Landfill. During permitting activities for the New Landfill, five groundwater monitoring wells (MW01 through MW05) were installed.

3.2 FIELD INVESTIGATIONS

This section presents the sampling activities at the Old Landfill, Impact Area, Battery Acid Disposal Areas, Wash Racks Area, and Wastewater Sludge Lagoon Area. These activities were selected on the basis of available limited groundwater flow direction information from Camp Atterbury, regional information previously presented in Section 3.1, and available historical information regarding site operations obtained from Camp Atterbury personnel.

Field investigations at Camp Atterbury were conducted at the five previously identified areas. Investigations included monitoring well installation and sampling, soil borings, soil/sludge sampling, and sediment sampling to characterize environmental impacts at the site. The following sections describe investigation activities performed at the specific areas of concern at Camp Atterbury.

3.2.1 Impact Area

The Impact Area comprises the central portion of the Camp Atterbury property (Figure 2). The Impact Area has been in use since 1942 and is currently used for both air-to-ground and ground-to-ground firing (Abel, 1995). In addition, several small-arms firing ranges are located within its confines. Routine surface burns of the area are conducted in the spring to control vegetation (Abel, 1995). Access to the area is strictly controlled by the Camp Atterbury Range Facilities Management office, and all travel into and out of the area must be coordinated with the range management office.

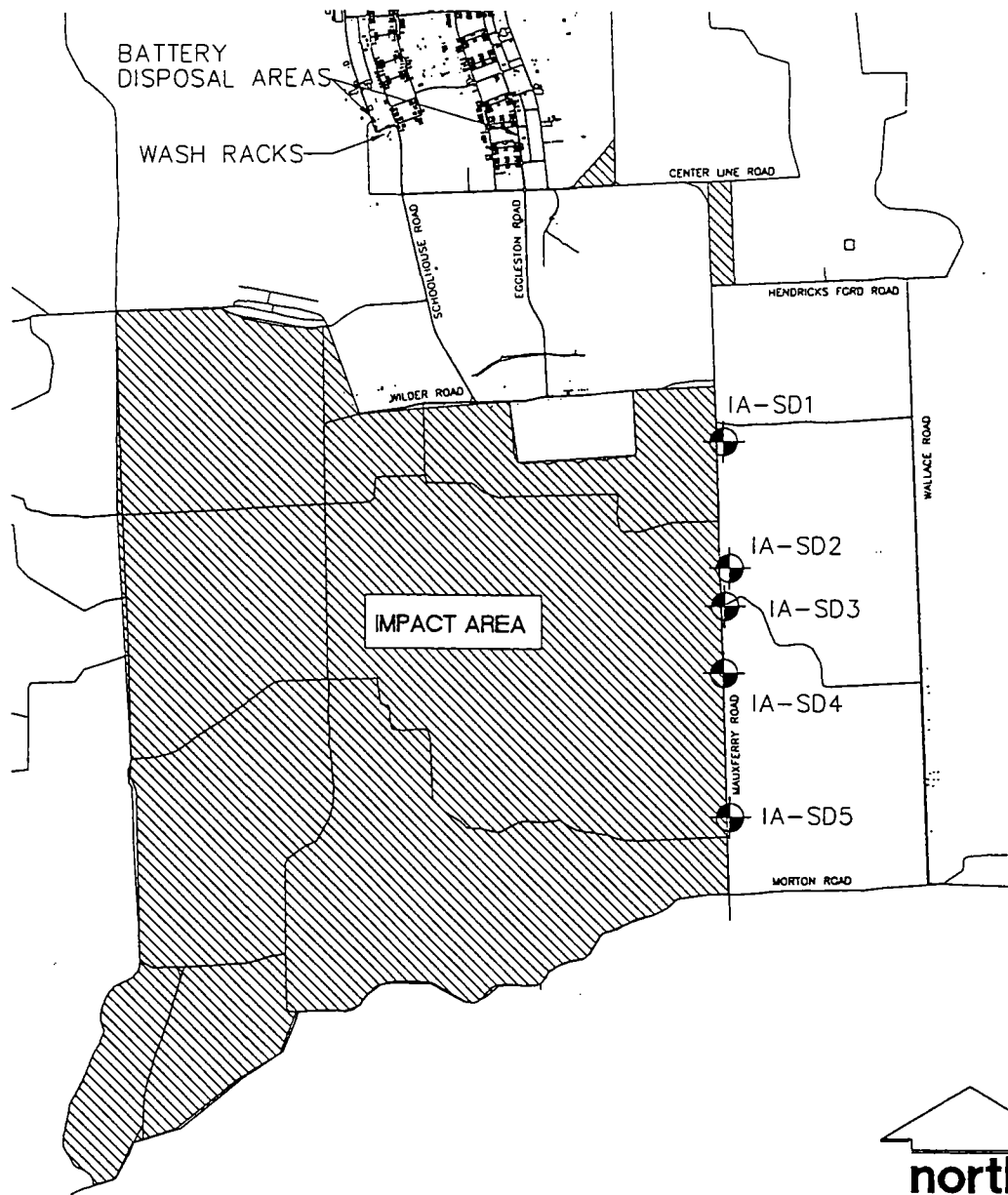
Due to access restrictions, no past investigations have been performed within the Impact Area. In 1992, a stream survey/shop discharge sampling project was performed at Camp Atterbury by Alt & Witzig Engineering, Inc. (Alt & Witzig). The sampling event included the collection of 18 water samples, 10 of which were surface water samples collected from major drainage courses at the point where they intersect the Camp Atterbury property boundary. These drainage

courses included streams which emanated from the Impact Area. Samples were analyzed for pH, biochemical oxygen demand (BOD), suspended solids, phosphate, nitrate, oil and grease, nitrogen ammonia, total kjeldahl nitrogen, chemical oxygen demand (COD), and benzene. With the exception of one sample with an elevated BOD result, "all tested parameters were within either an established regulatory threshold or within established background levels for Indiana streams" (Alt & Witzig, 1992a).

Due to access restrictions, no sampling was conducted within the Impact Area during the stream survey/shop discharge sampling project. Rather, a total of five sediment samples were collected from streams exiting the Impact Area. Sampling locations are illustrated in Figure 3. Sediment samples (IA-SD1, IA-SD2, IA-SD3, IA-SD4, and IA-SD5) were collected using methods detailed in the FSP (Montgomery Watson, April, 1996). Samples were analyzed for metals, cyanide, total phosphorous, volatile organic compounds (VOCs), pesticides, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), organophosphorous pesticides, and chlorinated herbicides.


3.2.2 Battery Disposal Areas

A total of three areas have been identified as past disposal locations for battery fluids. Two areas are located near Building 123; a former four ft by four ft pit located northeast of the building and a neutralization tank discharge area located just east of the easternmost corner of the building (Figure 2). Camp Atterbury personnel indicate the former four ft by four ft pit was used from approximately 1972 to 1976 or 1978 for the disposal of un-neutralized acids (Wright, 1995). Batteries were placed upside down on a wooden pallet in the pit and allowed to drain. From approximately 1976 (or 1978) until approximately 1989, battery acids were neutralized in an aboveground storage tank located just east of Building 123 (Wright, 1995). Acids were placed in the tank and neutralized with soda; the fluids were then discharged to the ground adjacent to the tank.



LEGEND

 SEDIMENT SAMPLE LOCATION (APPROXIMATE)

0 5000 10000

 SCALE IN FEET

MILITARY DEPARTMENT OF INDIANA
 CAMP ATTERBURY SITE INVESTIGATION
 EDINBURGH, INDIANA

IMPACT AREA - SAMPLE LOCATIONS

FIGURE 3

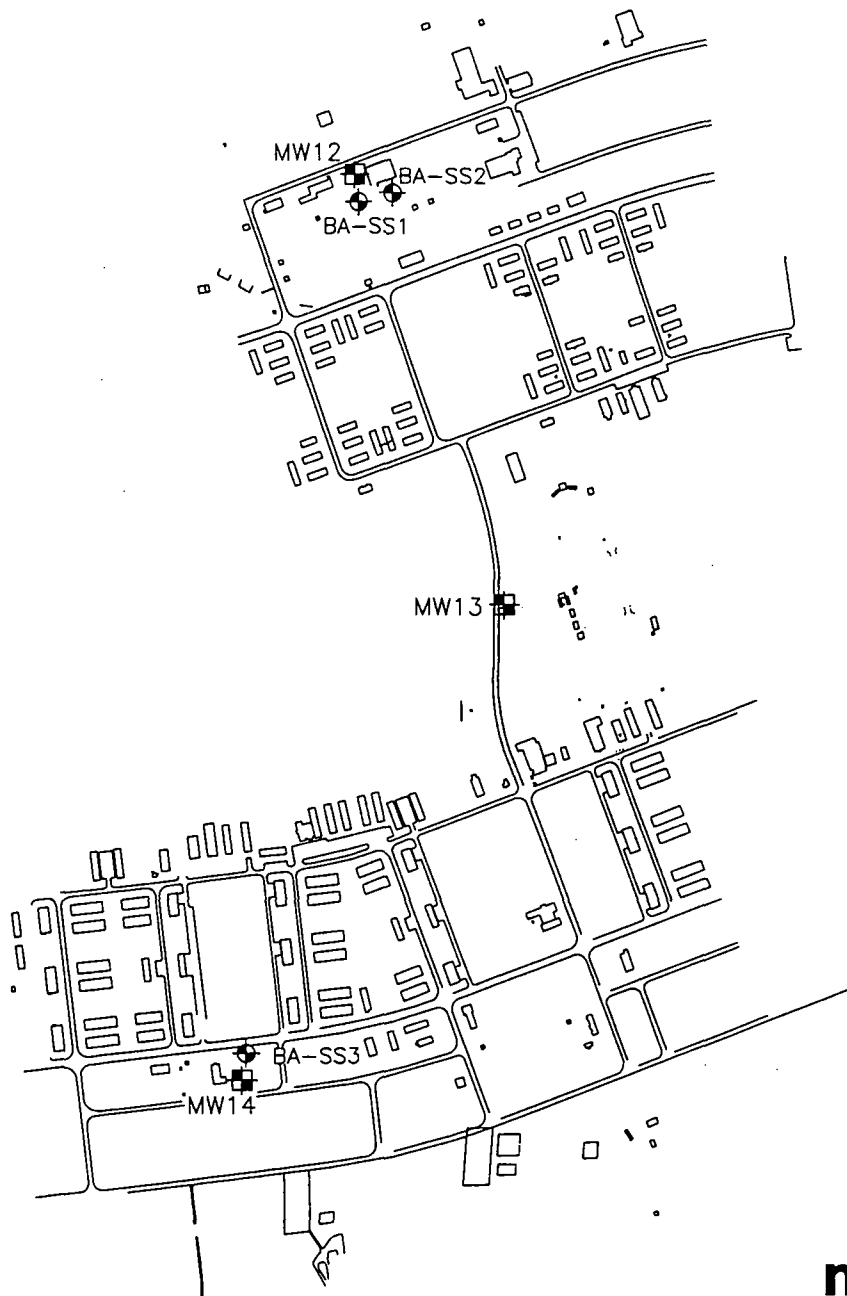
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The third disposal area is located immediately adjacent to Building 595 (Figure 2). A battery room with a sink is located inside the northern portion of the building. A drain pipe exits the sink and discharges into the subsurface just east of the battery room (Wright, 1995). Maintenance personnel indicated that a metal sewer pipe located north of Building 595 has required repeated repairs (Wright, 1995). Stained soils were reportedly noted during excavations for sewer line repair. Excavations to approximately six ft bgs were required for sewer line repairs; all soils were reportedly placed back in the excavation each time repairs were complete. There have been no previous investigations of any of the three disposal areas.



A total of three soil borings (BA-SB1, BA-SB2, and BA-SB3) were drilled using hollow stem auger drilling techniques. One boring was located at or near the center of the two disposal areas at Building 123; a boring was located near the discharge point of the sink at Building 595. Boring locations are illustrated in Figure 4. Each boring was advanced to a depth of 20 ft bgs. Soil samples were collected for laboratory analysis at 5-foot intervals from the ground surface to the total depth of each boring using split-spoon sample techniques detailed in the FSP. Samples were analyzed for lead and pH. In order to assess potential impacts to groundwater and to characterize hydrogeological conditions, three additional monitoring wells (MW12, MW13, and MW14) were installed in the Battery Disposal Areas. Monitoring well locations are shown in Figure 4. Groundwater samples were analyzed for metals and pH. Soil samples (BA-MW12SS, BA-MW13SS, and BA-MW14SS) obtained from the installation of the monitoring wells were also submitted for analysis of lead and pH. Installed wells were slug tested and water levels were recorded to characterize hydrogeologic conditions at the site.

3.2.3 Wastewater Sludge Lagoon Area

The Wastewater Sludge Lagoon Area lies in the northeastern portion of Camp Atterbury, just north of Center Line Road, and east of the Old and New Landfills. The Weston PA Report does not note the Wastewater Sludge Lagoon Area as an area of potential concern. Wastewater treatment liquids flow continuously from flocculation tanks and clarifiers in the privately-owned treatment plant to the two wastewater treatment sludge lagoons located on Camp Atterbury



LEGEND

- MW01  MONITORING WELLS
- BA-SS3  SOIL BORING

0 1000 2000
SCALE APPROXIMATE

MILITARY DEPARTMENT OF INDIANA
CAMP ATTERBURY SITE INVESTIGATION
EDINBURGH, INDIANA

BATTERY DISPOSAL AREA
SAMPLING LOCATIONS

FIGURE 4



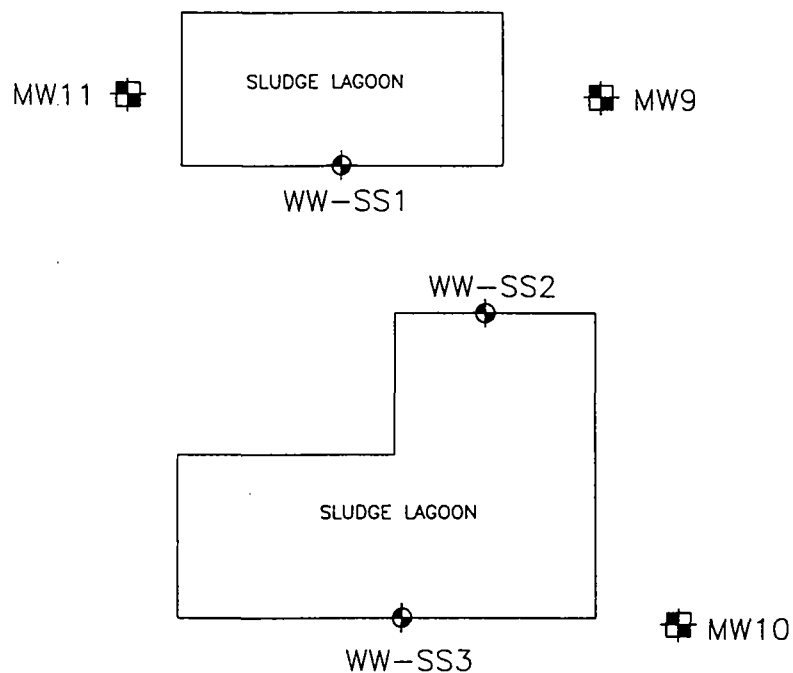
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property. No analytical data were available for this area; however, the potential existed for constituents in the wastewater treatment sludge to leach to soil and groundwater at concentrations of concern. No investigations had previously been conducted in this area.

The Wastewater Sludge Lagoon Area activities consisted of installing three monitoring wells (MW9, MW10, and MW11), sampling the soil and groundwater at these three locations, and collecting three soil/sludge samples from the lagoons. Monitoring well installation and sampling locations are illustrated in Figure 5. Soil samples (WW-SBMW9, WW-SBMW10, and WW-SBMW11) were collected for laboratory analysis from the monitoring well installations both at the ground surface and directly above the water table using split-spoon sample techniques detailed in the FSP. Three groundwater samples and three soil/sludge samples (WW-SS1, WW-SS2, and WW-SS3) were collected and submitted to the analytical laboratory. Soil/sludge and soil samples were analyzed for target analyte list (TAL) inorganics, organochlorinated (OC) pesticides and PCBs, and total phosphorous. Groundwater samples were analyzed for VOCs, SVOCs, OC and organophosphorous (OP) pesticides, PCBs, chlorinated herbicides, TAL inorganics, and total phosphorous. The laboratory analytical program is detailed in the FSP.

3.2.4 Old Landfill Area

The Old Landfill is located in the eastern portion of Camp Atterbury, just west of the New Landfill (Figure 3). The Old Landfill operated from approximately the early 1970s to 1980. Historical aerial photographs from 1974 indicate the landfill is active while photographs from 1983 indicate no activity at the site (McWhorter, 1995). The Old Landfill was created in the early 1970s to accommodate construction debris generated during the demolition of the former 100 Block buildings (Engleking, 1995). The 100 Block buildings, which were located north of the current boundary of Camp Atterbury on property, are now controlled by the Atterbury Fish and Wildlife Area. The 100 Block buildings were constructed of wood and concrete and were used as barracks. During demolition of the buildings, material was hauled to the Old Landfill site, placed in a trench, and burned to reduce the volume. Camp Atterbury personnel familiar with the landfilling activities indicate that small amounts of fuel were used to ignite the debris (Engleking, 1995). The landfill is located adjacent to a former incinerator site that was not related to landfilling operations. Indiana State Board of Health Inspection report notes dated July 6, 1983 indicate that refuse was present around the former incinerator site (Indiana State

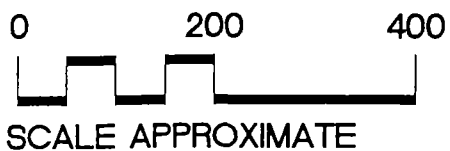


LEGEND

-  MONITORING WELL
-  SOIL/SLUDGE SAMPLE

NOTES

1. AREA TOPOGRAPHY IS TYPICALLY HORIZONTAL TO SUBHORIZONTAL



MILITARY DEPARTMENT OF INDIANA
CAMP ATTERBURY SITE INVESTIGATION
EDINBURGH, INDIANA

WASTEWATER SLUDGE LAGOON AREA
SAMPLING LOCATIONS

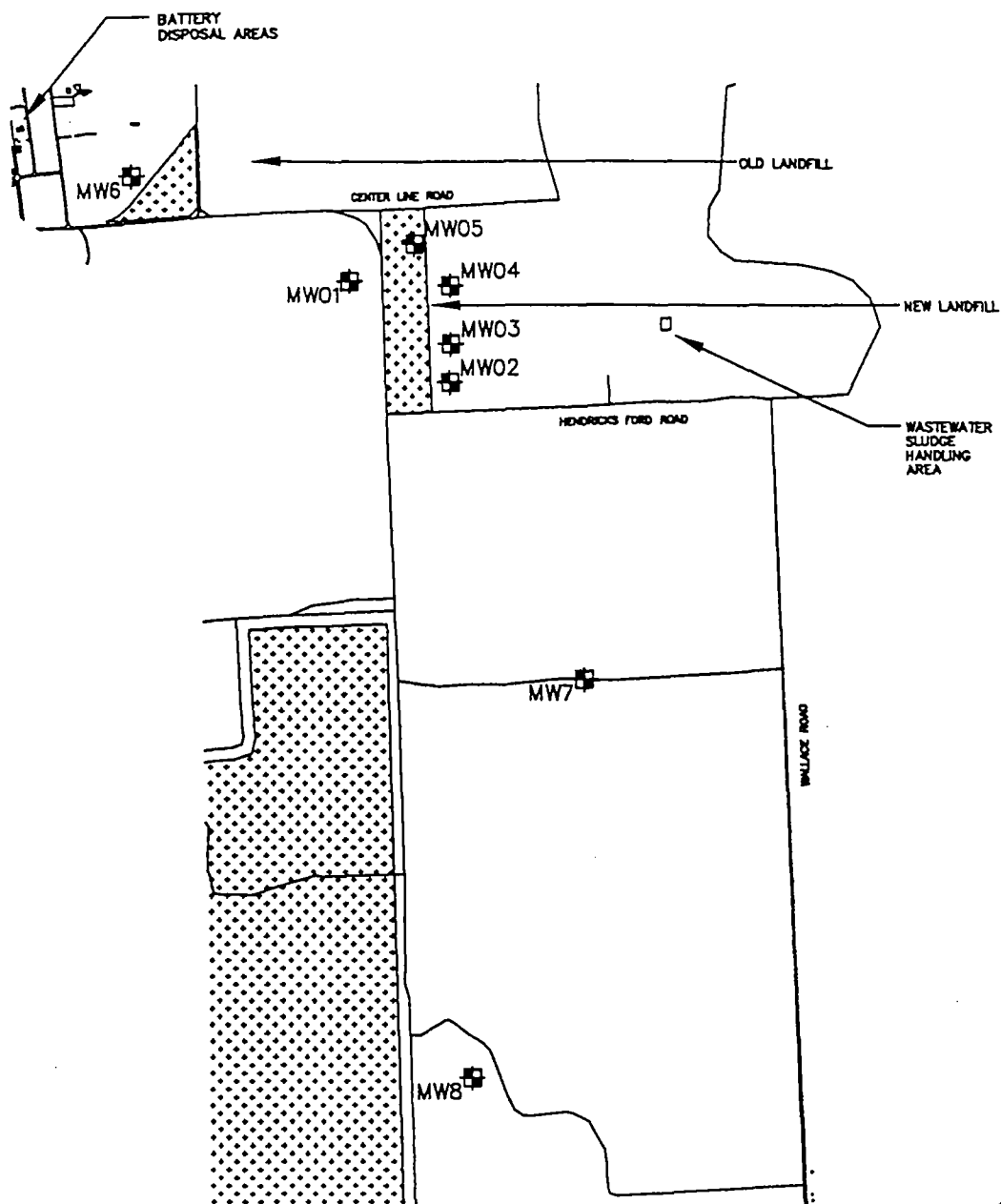
FIGURE 5



MONTGOMERY WATSON

Board of Health, 1983). Camp Atterbury personnel indicate that some general trash from training activities (food packaging, etc.) may have been placed at the Old Landfill. However, trash inappropriately disposed at the Old Landfill by departing training groups was routinely removed and transported to the New Landfill. Thus, the amount of general trash disposed in the Old Landfill is thought to be minimal (Engleking, 1995). Because the National Guard has historically maintained strict accounting and reporting procedures for control of ordnance, it is unlikely that any ordnance was inappropriately disposed in the Old Landfill. There have been no previous investigations of the Old Landfill site. Based on available, limited groundwater flow information for the eastern portion of the facility, the Old Landfill is located hydraulically upgradient of the New Landfill. Thus, the monitoring well located upgradient of the New Landfill (MW01) provides an indication of groundwater quality in the presumed downgradient direction from the Old Landfill. This well is included in an ongoing groundwater monitoring program for the New Landfill, and to date, no impacts have been identified. The presumed general groundwater flow direction in the eastern portion of the facility is south-southeast. In order to confirm this flow direction, three additional wells were constructed (MW6 through MW8). The locations of the three additional wells are illustrated in Figure 6.

Monitoring well MW6 is located in the parking lot just west of the Old Landfill. This location provides a data point for groundwater elevation further west than the existing monitoring well network. This well serves as an upgradient well for the Old Landfill. Monitoring well MW7 is located on Pleasant Run Road between Mauxferry Road and Wallace Road. If the general south-southeast groundwater flow direction is confirmed, this well will serve as a downgradient well for the Impact Area, and the Old and New Landfills. Analytical results from this well provide an indication of groundwater quality upgradient of private water supply wells located along Wallace Road. Monitoring well MW8 is located east of Mauxferry Road at its intersection with Clark Trail. If the general south-southeast groundwater flow direction is confirmed, this well will serve as a downgradient well for the Impact Area. Analytical results from this well will also provide an indication of groundwater quality immediately upgradient of private water supply wells located along Wallace Road.



LEGEND

MW01 MONITORING WELLS

*NOTE:
MONITORING WELLS MW-1 THROUGH MW-5
WERE NOT INSTALLED UNDER THIS SI.

0 2500 5000



SCALE IN FEET



MILITARY DEPARTMENT OF INDIANA
CAMP ATTERBURY SITE INVESTIGATION
EDINBURGH, INDIANA
OLD LANDFILL AREA
SAMPLING LOCATIONS

FIGURE 6



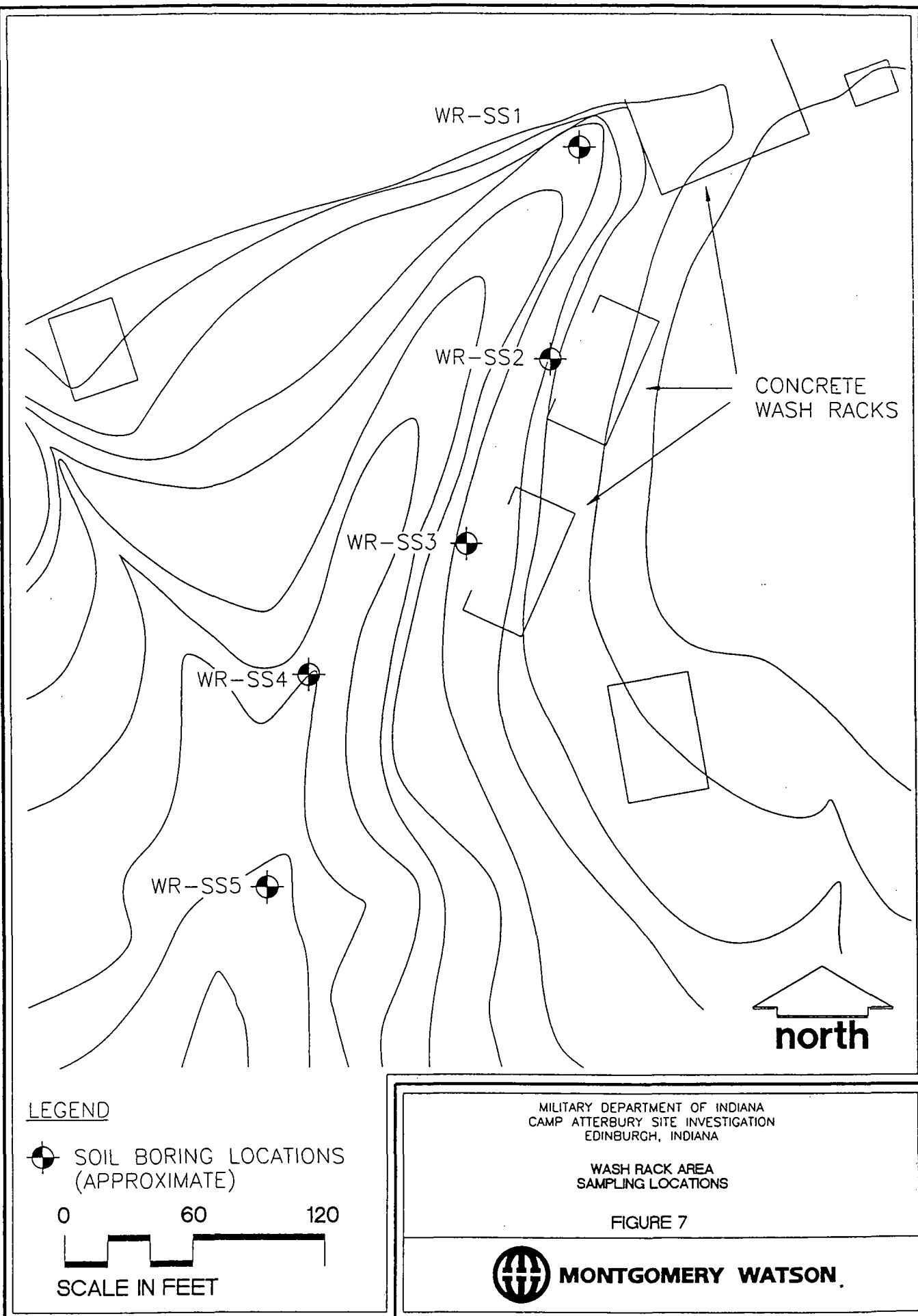
MONTGOMERY WATSON

During drilling, soil samples were collected from the ground surface to the total depth of each boring for lithologic logging purposes. Because these wells were not located in potential source areas, no soil samples were submitted for laboratory analysis. The three wells were constructed, developed, sampled, and slug tested in accordance with the procedures detailed in the FSP.

3.2.5 Wash Rack Area

The PA Report noted stained soils present in wash rack area, but did not provide specific locations of staining (Weston, 1993). At the time of the site visit for planning of SI activities, staining was not identified in wash rack area. Personnel at Camp Atterbury and MDI indicated that the high pressure wash rack located south of 21st Street was the most likely location for potential concern. Other wash racks located within Camp Atterbury consist primarily of concrete pads with regular garden hose spigots and were used for removal of dirt and dust from vehicles. The high pressure wash rack has historically been used for cleaning of larger vehicles and engines.

The high pressure wash rack consists of a total of three concrete pads with high pressure water supply. The pads drain northeast to a large unlined ditch. Each pad is sloped such that three smaller drainage courses are superimposed on the overall drainage slope of each pad. The large drainage ditch drains south to a small standing water body that contained dense vegetation at the time of the site visit (October 1995). Several small earthen mounds were present in the vicinity of the wash rack and recent signs of activity by earth moving equipment were visible (i.e., heavy equipment tracks). In 1992, Alt & Witzig performed soil/sediment sampling at maintenance areas and within drainage ditch systems within the cantonment area of Camp Atterbury (Alt & Witzig, 1992b). The investigation included collecting samples at 12 locations using a hand auger; one location sampled was within the drainage area of the high pressure wash rack. The sample consisted of a composite from 6 inches bgs to 4.0 ft bgs. Alt & Witzig (1992b) report that the sample contained cadmium at a concentration of 1.58 parts per million (ppm), chromium at 11.1 ppm, lead at 68.5 ppm, and total petroleum hydrocarbons (TPH) at 37.1 ppm. No other sampling has been performed in the area of the high pressure wash rack.



Soil samples (WR-SS1, WR-SS2, WR-SS3, WR-SS4, and WR-SS5) were collected using hand auger methods at a total of five locations as illustrated on Figure 7. Samples were collected at the ground surface (0 to 6 inches bgs), and at depths of 1.0 to 1.5 and 2.0 to 2.5 ft bgs. A total of 15 samples were collected and submitted to the analytical laboratory. Initially, only the surface sample from each location was analyzed for TPH, gasoline range organics (GRO), and diesel range organics (DRO). Upon receipt of analytical data for these initial samples, it was determined that additional samples be taken at WR-SS2, WR-SS3, and WR-SS5, and analyzed for VOCs and SVOCs. The laboratory analytical program is detailed in the FSP along with hand auger sampling methods.

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4.0 RESULTS

4.1 GROUNDWATER SAMPLING RESULTS

The following sections provide information on groundwater flow and quality in the Battery Disposal Areas, Wastewater Sludge Lagoon Area, and Impact Area. Concentrations of the groundwater contaminants analyzed for in each area were compared to Tier II Non-residential Cleanup Criteria for groundwater as specified in the regulations for the Indiana Voluntary Remediation Program (VRP) (IDEM, July 1996). The use of IDEM VRP Tier II Non-residential Cleanup Criteria was decided upon by MDI and Montgomery Watson and confirmed by IDEM at the 2 August 1996 meeting between IDEM, MDI, and Montgomery Watson (see Appendix A). The IDEM VRP Tier II Non-residential Cleanup Criteria are provided in Appendix B.

4.1.1 Battery Disposal Areas

Monitoring wells MW12, MW13, and MW14 were installed in the Battery Disposal Areas. Well construction data is presented in Appendix C. Appendix D contains well development data sheets. Locations of the monitoring wells are presented in Figure 4. Wells were installed and subsequently developed and sampled by Montgomery Watson. Groundwater sampling data sheets are contained in Appendix E. Samples were analyzed for metals and pH. Analytical results are summarized in Table 1. Complete analytical data and analyte lists are provided in Appendix F. No groundwater samples contained lead concentrations above the IDEM VRP Tier II Non-residential Cleanup Criteria of 0.015 parts per million (ppm). No other constituents analyzed for were detected in the samples.

All monitoring wells were slug tested and water levels were taken in order to adequately characterize groundwater flow in the area. Slug test results and water level readings are summarized in Tables 2 and 3. Based on static water level data, shallow groundwater flow direction in this area appears to be to the east. Groundwater flow contours were determined for the Battery Disposal Areas and are plotted in Figure 8. Slug testing results showed the mean hydraulic conductivity in the formation to be approximately 0.92 ft per day.

**Table 1- Analytical Results: Battery Disposal Areas Groundwater Samples, MW12-0896
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Manganese- 0.130 Others Not Detected	N/A Varies (see Appendix B)

J:\4162\0200\0DRAFTS\DRF\TS\ANAL\TAB.DOC

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 1- Analytical Results: Battery Disposal Areas Groundwater Samples, MW12-DUP-0896
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Manganese- 0.140 Others Not Detected	N/A Varies (see Appendix B)

J:\4162\0200\0DRAFTS\DRFTS\ANALTAB.DOC

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 1- Analytical Results: Battery Disposal Areas Groundwater Samples, MW13-0896
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Manganese- 0.076 Others Not Detected	N/A Varies (see Appendix B)

J:\4162\0200\0DRAFTS\DRFTS\ANAL.TAB.DOC

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 1- Analytical Results: Battery Disposal Areas Groundwater Samples, MW13-DUP-0896
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Manganese- 0.10 Others Not Detected	N/A Varies (see Appendix B)

J:\4162\0200\0DRAFTS\DRFTS\ANALTAB.DOC

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 1- Analytical Results: Battery Disposal Areas Groundwater Samples, MW14-0896
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	None Detected	Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

Table 1- Analytical Results: Battery Disposal Areas Groundwater Samples, MW14-DUP-0896
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	None Detected	Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 2- Battery Acid Areas Slug Test Data
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

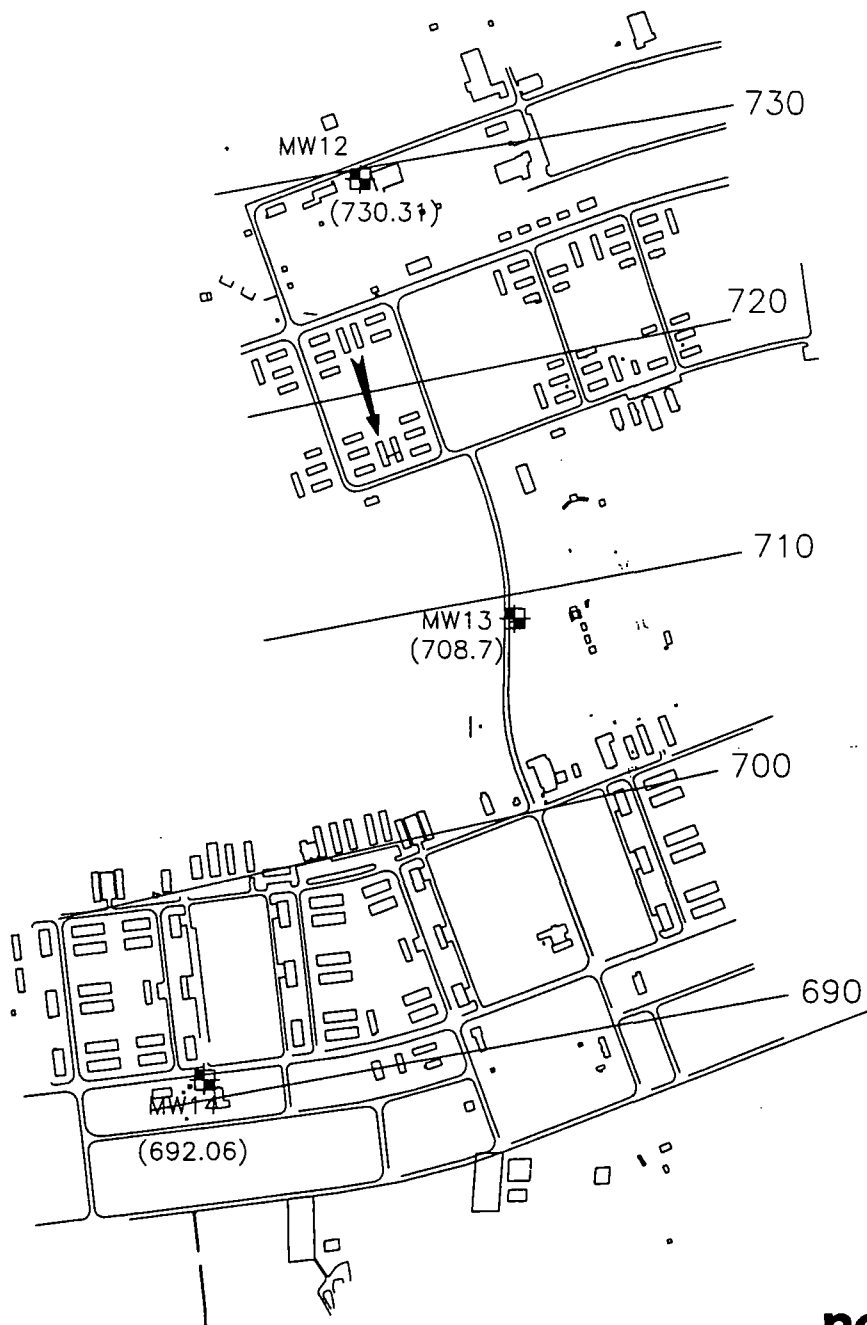
Well ID	Water level (ft) (8/21/96)	Depth of Well (ft)	Screened Interval (ft)	Formation screened	K (ft/day)
MW12	4.62	12.00	2-12	silty clay	2.97
MW13	19.32	32.50	22.5-32.5	silty clay, 6" sand seam	0.147
MW14	20.62	29.30	19.3-29.3	silty clay, C-F sand	1.80
Geometric Mean Hydraulic Conductivity (K): 0.92 ft/day					

**Table 3- Battery Acid Areas Water Level Data
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

8/6/96				9/25/96		
Well ID	TOC (ft amsl)	Depth to water (ft BTOC)	Groundwater Elevation (ft amsl)	TOC (ft amsl)	Depth to water (ft BTOC)	Groundwater Elevation (ft amsl)
MW12	733.15	8.88	724.27	733.15	2.84	730.31
MW13	712.45	31.60	680.85	712.45	3.75	708.70
MW14	712.65	20.68	691.97	712.65	20.59	692.06




Notes:

amsl= above mean sea level
ags= above ground surface
BTOC= below top of casing
TOC= top of casing



north

LEGEND

- MW01
-  MONITORING WELLS
-  GROUNDWATER FLOW DIRECTION
-  GROUNDWATER CONTOUR LINE
(DASHED WHERE INFERRED)
- () WATER ELEVATION ABOVE
MEAN SEA LEVEL

0 1000 2000
SCALE APPROXIMATE

MILITARY DEPARTMENT OF INDIANA
CAMP ATTERBURY SITE INVESTIGATION
EDINBURGH, INDIANA

BATTERY DISPOSAL AREAS
GROUNDWATER FLOW CONTOURS

FIGURE 8



MONTGOMERY WATSON

Groundwater flow velocity in the region was calculated to be $5.56\text{E-}08$ ft per second. The water table was found at an average depth of 20 ft bgs in a formation comprised mostly of medium dense, silty clay.

4.1.2 Wastewater Sludge Lagoon Area

Three monitoring wells (MW9, MW10, and MW11) were installed in the Wastewater Sludge Lagoon Area. Monitoring well locations are shown in Figure 5. Wells were developed and sampled according to procedures set forth in the FSP. Well construction data, well development data sheets, and groundwater sampling data sheets are contained in Appendices C, D, and E, respectively. The monitoring wells were sampled for metals, VOCs, SVOCs, chlorinated herbicides, OP pesticides, pesticides, PCBs, cyanide, and total phosphorous. Analytical results are summarized in Table 4 and complete analytical data and analyte lists are provided in Appendix F. No contaminant was found to be present in groundwater at concentrations above IDEM VRP Tier II Non-residential Cleanup Criteria in any of the three monitoring wells.

Slug testing was performed on all three wells in the Wastewater Sludge Lagoon Area and water levels were also recorded prior to sampling. Slug test and water level data is presented in Tables 5 and 6. Data was used in preparing groundwater flow contours for Camp Atterbury. Groundwater flow direction and contours are depicted in Figure 9. Groundwater flow direction is to the south-southeast, confirming the shallow groundwater flow direction. Mean hydraulic conductivity of the formation was assessed from slug test results and determined to be approximately 20.4 ft per day. Flow velocity was estimated to be approximately $1.89\text{E-}06$ ft per second. The water table was found at an average depth of six ft bgs in a formation comprised mostly of medium dense, fine to coarse sand.

**Table 4- Analytical Results: Wastewater Sludge Lagoon Area Groundwater Samples, MW-9
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	2.044
Total Phosphorous	6/25/96	365.2	0.09	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	None Detected	Varies (see Appendix B)

J:\4162\0200\DRAPTS\DRFTS\ANL\TAB4A.DOC

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 4- Analytical Results: Wastewater Sludge Lagoon Area Groundwater Samples, MW-10
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	2.044
Total Phosphorous	6/25/96	365.2	0.85	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 0.014 Barium- 0.220 Nickel- 0.084 Zinc- 0.016 Other Not Detected	Arsenic- 0.050 Barium- 7.154 Nickel- 2.044 Zinc- 30.66 Varies (see Appendix B)

J:\4162\0200\0DRAFTS\DRFTS\ANLTAB4A.DOC

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 4- Analytical Results: Wastewater Sludge Lagoon Area Groundwater Samples, MW-11
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	2.044
Total Phosphorous	6/25/96	365.2	0.18	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Barium- 0.130 Zinc- 0.029 Other Not Detected	Barium- 7.154 Zinc- 30.66 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 5- Old Landfill, Impact Area, and Wastewater Sludge Lagoon Area Slug Test Data
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

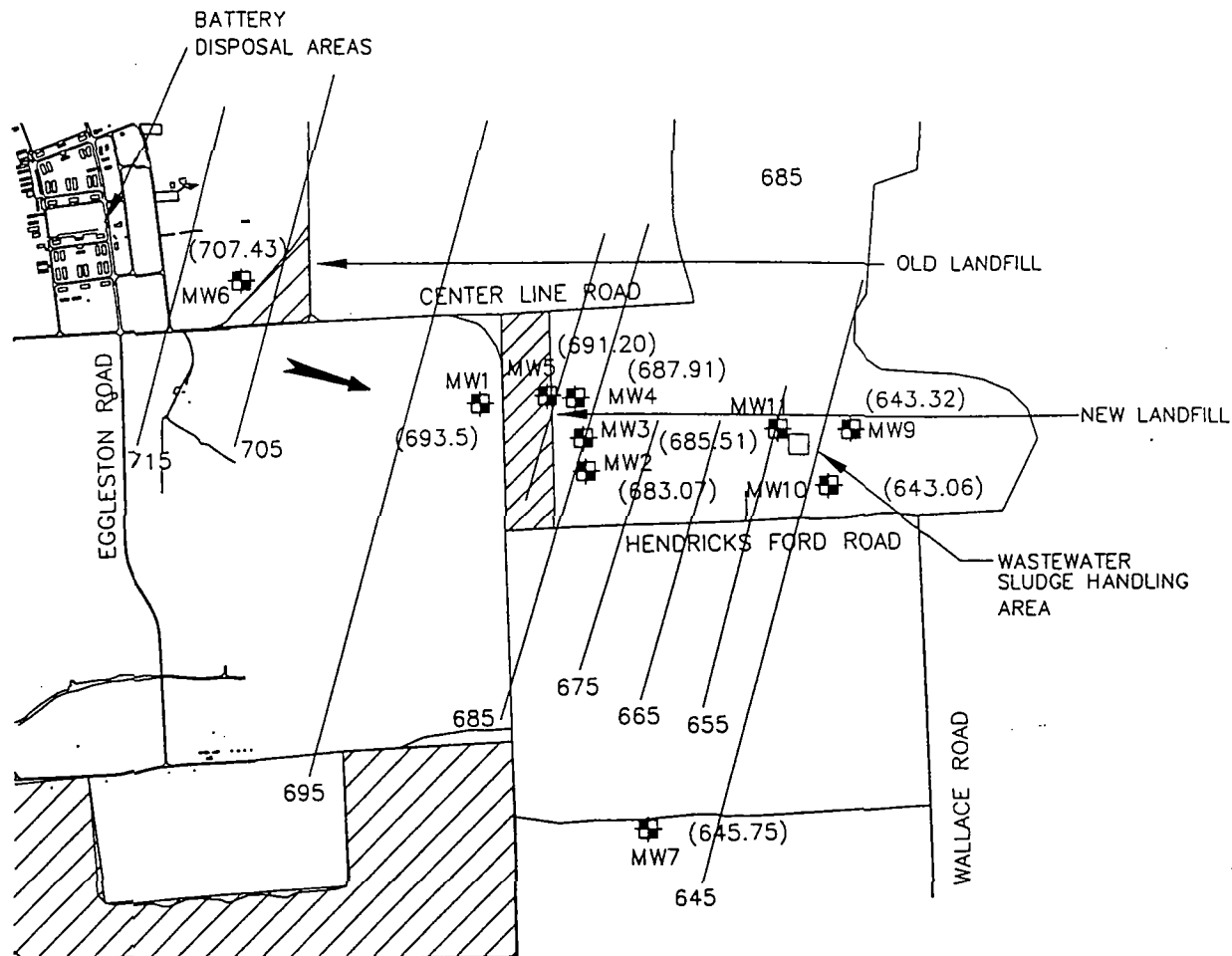
Well ID	Water level (ft) (8/21/96)	Depth of Well (ft)	Screened Interval (ft)	Formation screened	K (ft/day)
MW6	1.00	20.00	10-20	silty sand	2.45
MW7	5.72	15.00	5-15	coarse-fine sand	7.56
MW8	artesian	30.00	20-30	silty clay, gravel	artesian
MW9	6.60	15.00	5-15	coarse-fine sand	120.42
MW10	7.60	15.00	10-15	coarse-fine sand	52.44
MW11	6.19	9.00	4-9	silty clay, coarse-fine sand	30.24
Geometric Mean Hydraulic Conductivity (K): 20.40 ft/day					

**Table 6- Old Landfill, Impact Area, and Wastewater Sludge Lagoon Area Water Level Data
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Well ID	6/29/96			8/6/96			9/25/96		
	TOC (ft amsl)	Depth to water (ft BTOC)	Groundwater Elevation (ft amsl)	TOC (ft amsl)	Depth to water (ft BTOC)	Groundwater Elevation (ft amsl)	TOC (ft amsl)	Depth to water (ft BTOC)	Groundwater Elevation (ft amsl)
MW1	744.77	52.70	692.07	744.77	50.58	694.19	744.77	51.22	693.55
MW2	690.47	8.10	682.37	690.47	7.19	683.28	690.47	7.4	683.07
MW3	700.00	14.42	685.58	700.00	13.75	686.25	700.00	14.49	685.51
MW4	714.61	27.46	687.15	714.61	26.12	688.49	714.61	26.7	687.91
MW5	717.67	27.74	690.02	717.67	26.01	691.75	717.67	26.56	691.20
MW6	708.71	artesian	artesian	708.71	0.50	708.21	708.71	1.28	707.43
MW7	652.74	2.32	650.42	652.74	5.80	646.94	652.74	6.99	645.75
MW8	664.66	artesian	artesian	664.66	2.30 ags	666.96	664.66	5.50 ags	670.16
MW9	650.65	3.80	646.85	650.65	6.49	644.16	650.65	7.33	643.32
MW10	650.66	4.18	646.48	650.66	6.61	644.05	650.66	7.6	643.06
MW11	654.31	4.08	650.23	654.31	6.90	647.41	654.31	6.29	648.02

Notes:

amsl= above mean sea level
ags= above ground surface
BTOC= below top of casing
TOC= top of casing



LEGEND

- MW1 MONITORING WELLS
- GROUNDWATER CONTOUR LINE (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION
- () WATER ELEVATION ABOVE MEAN SEA LEVEL

NOTE: MW8 NOT INCLUDED IN CONTOUR MAP

0 2500 5000



SCALE IN FEET

MW8
(SEE NOTE)



MILITARY DEPARTMENT OF INDIANA
CAMP ATTERBURY SITE INVESTIGATION
EDINBURGH, INDIANA

OLD LANDFILL AREA
GROUNDWATER FLOW

FIGURE 9



MONTGOMERY WATSON

4.1.3 Old Landfill Area and Impact Area

Three monitoring wells (MW6, MW7, and MW8) were installed around the Old Landfill and Impact Areas in order to characterize groundwater flow and quality in those areas. Well locations are given in Figures 3 and 6. Wells were installed, developed, and sampled in accordance with procedures set forth in the FSP. Well construction data is contained in Appendix C. Well development data sheets are in Appendix D. Appendix E contains groundwater sampling data sheets. The five existing monitoring wells around the New Landfill were used to aid in characterization of groundwater flow in the region. Additionally, existing monitoring well MW01 was sampled in order to aid in characterization of groundwater quality in the area of the new landfill.

Sampling results of the wells are contained in Table 7. Samples were analyzed for metals, VOCs, SVOCs, PCBs, pesticides, OP pesticides, chlorinated herbicides, total phosphorous, and cyanide. No analyte was present in concentrations above IDEM VRP Tier II Non-residential Cleanup Criteria in any of the four wells sampled. Analytical data and complete analyte lists are presented in Appendix F.

Slug tests were performed on the three newly installed wells and water levels were taken on the three new wells, as well as the five existing wells. The water table was found at an average depth of 13 ft bgs. Data was combined with data received from the Wastewater Sludge Lagoon Area in order to characterize groundwater flow in the region. Groundwater flow contours and direction are given in Figure 9. Flow direction is to the south-southeast. Mean hydraulic conductivity of the aquifer calculated through slug tests was determined to be 20.4 ft per day. Flow velocity in the aquifer was estimated at $1.89\text{E-}06$ ft per second. The underlying formation was found to be comprised of medium dense, fine to medium sand. Slug test and water level data are presented in Tables 5 and 6.

**Table 7- Analytical Results: Old Landfill Area Groundwater Samples, MW-1
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	2.044
Total Phosphorous	6/25/96	365.2	1.0	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	None Detected	Varies (see Appendix B)

J:\4162\0200\DRAPTS\DRFTS\IANLTAB7A.DOC

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 7- Analytical Results: Old Landfill Area Groundwater Samples, MW-6
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	2.044
Total Phosphorous	6/25/96	365.2	Not Detected	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	None Detected	Varies (see Appendix B)

J:\4162\0200\DRAPTS\DRFTS\IANLTAB7B.DOC

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 7- Analytical Results: Old Landfill Area Groundwater Samples, MW-7
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	2.044
Total Phosphorous	6/25/96	365.2	0.69	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Zinc- 0.010 Others Not Detected	Zinc- 30.66 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 7- Analytical Results: Old Landfill Area Groundwater Samples, MW-8
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	2.044
Total Phosphorous	6/25/96	365.2	0.04	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Silver- 0.011 Others Not Detected	Silver- 0.511 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

4.2 SOIL SAMPLING RESULTS

Soil sampling was conducted by means of soil borings (Battery Disposal Areas), hand augering (Wash Rack Area), or through monitoring well installation (Wastewater Sludge Lagoon Area and Battery Disposal Areas). Soil boring logs can be found in Appendix G. Concentrations of contaminants of concern in the soils sampled were compared to IDEM VRP Tier II Non-residential subsurface soil or surface soil (where appropriate) Cleanup Criteria. Results of the soil sampling are presented below.

4.2.1 Battery Disposal Areas

Three soil borings (BA-SB1, BA-SB2, and BA-SB3) were advanced in the Battery Disposal Areas. Additionally, soil samples were obtained from the three monitoring wells (MW12, MW13, and MW14) installed in the areas. The locations of the borings and wells are shown in Figure 4. Soil boring samples were collected in five foot intervals to a maximum depth of 20 ft. Samples collected from the monitoring wells were also collected in five foot intervals to the total depth of each well. The borings were drilled and soils were sampled in accordance with the procedures set forth in the FSP.

Soil samples were analyzed for metals and pH. Results of the sampling are summarized in Table 8. Analytical data and analyte lists are presented in Appendix F. No soil sample from either the wells or borings exhibited concentrations of metals in exceedance of IDEM VRP Tier II Non-residential Cleanup Criteria.

4.2.2 Wastewater Sludge Lagoon Area

Soil samples in the Wastewater Sludge Lagoon Area (WW-SBMW9, WW-SBMW10, and WW-SBMW11) were collected during the installation of the three monitoring wells in the area (MW9, MW10, and MW11). Sample locations are shown in Figure 5. Samples were collected both at the ground surface and at locations directly above the water table. Sampling was conducted in accordance with procedures set forth in the FSP.

**Table 8- Analytical Results: Battery Disposal Area Soil Samples, BA-SB1
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
pH	6/28/95	6010A	Ground-7.20 5 feet- 7.20 10 feet- 7.20 15 feet- 7.20 20 feet- 7.20	N/A
Lead	6/28/96	6010A	Ground- 17 5 feet- 11 10 feet- 11 15 feet- 14 20 feet- 13	1000

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 8- Analytical Results: Battery Disposal Area Soil Samples, BA-SB2
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
pH	6/28/95	6010A	Ground-7.15 5 feet- 7.2 10 feet- 7.15 15 feet- 7.15 20 feet- 7.15	N/A
Lead	6/28/96	6010A	Ground- 29 5 feet- 13 10 feet-22 15 feet-12 20 feet- 7.2	1000

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 8- Analytical Results: Battery Disposal Area Soil Samples, BA-SB3
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
pH	6/28/95	6010A	Ground- 7.23 Duplicate- 6.83 5 feet- 7.2 10 feet- 7.2 15 feet- 7.2 20 feet- 7.2	N/A
Lead	6/28/96	6010A	Ground- 21 Duplicate- 16 5 feet- 22 10 feet- 9.4 15 feet- 9.5 20 feet- 16	1000

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 8- Analytical Results: Battery Disposal Area Soil Samples, BA-MW12SS
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
pH	6/28/95	6010A	Ground- 7.68 5 feet- 7.76 10 feet- 7.65 15 feet- 8.02 20 feet- 7.57 25 feet- 8.42	N/A
Lead	6/28/96	6010A	Ground- 31 5 feet- 24 10 feet- 8.3 15 feet- 7.1 20 feet- 11 25 feet- 10	1000

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 8- Analytical Results: Battery Disposal Area Soil Samples, BA-MW13SS
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
pH	6/28/95	6010A	Ground- 7.55 5 feet- 7.28 10 feet- 8.03 15 feet- 8.15 20 feet- 7.96 25 feet- 7.92	N/A
Lead	6/28/96	6010A	Ground- 24 5 feet- 11 10 feet- 18 15 feet- 8.3 15 feet DUP- 11 20 feet- 8.7 25 feet- 10	1000

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 8- Analytical Results: Battery Disposal Area Soil Samples, BA-MW14SS
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
pH	6/28/95	6010A	Ground- 7.44 5 feet- 6.47 10 feet- 6.80 15 feet- 6.78 20 feet- 7.57 20 feet DUP- 7.74 25 feet- 8.07	N/A
Lead	6/28/96	6010A	Ground- 22 5 feet- 21 10 feet- 21 15 feet- 22 20 feet- 10 20 feet DUP- 19 25 feet-	1000

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

Soil samples were submitted for laboratory analysis and analyzed for cyanide, total phosphorous, pesticides, PCBs, and metals. Analytical results are summarized in Table 9. Analytical data and analyte lists are presented in Appendix F. No soil sample from the Wastewater Sludge Lagoon Area exhibited contaminants in concentrations above IDEM VRP Tier II Non-residential Cleanup Criteria.

4.2.3 Wash Rack Area

Hand augering was conducted at five locations (WR-SS1, WR-SS2, WR-SS3, WR-SS4, and WR-SS5) in the Wash Rack Area. Sample locations are shown in Figure 7. Samples were collected at 0 to 0.5 ft bgs, 1.0 to 1.5 ft bgs, and 2.0 to 2.5 ft bgs. Samples were collected and analyzed in accordance with procedures set forth in the FSP.

Samples were analyzed for TPH, GRO, and DRO. Initially, only the samples in the first interval (0 to 0.5 ft) were analyzed. Samples were analyzed at increasing depths if TPH concentrations were greater than 100 ppm in the soil sample at the first interval. Sample points WR-SS2, WR-SS3, and WR-SS5 exhibited concentrations of TPH above 100 ppm and were subsequently resampled and analyzed for VOCs and SVOCs. No samples exhibited constituents above IDEM VRP Tier II Cleanup Criteria for VOCs or SVOCs. The IDEM sets standards only for constituents of VOCs and SVOCs under the VRP. No standards are provided, or needed, for TPH, GRO, or DRO. Sample results are summarized in Table 10 and analytical data is presented in Appendix F.

4.3 SEDIMENT SAMPLING RESULTS

Soil sediment samples were obtained from the Impact Area by means of a hand auger. Concentrations of contaminants of concern were compared to IDEM VRP Tier II Non-residential Cleanup Criteria for surface soils. Results of the sediment sampling are contained in the following section.

4.3.1 Impact Area

Five sediment samples (IA-SD1, IA-SD2, IA-SD3, IA-SD4, and IA-SD5) were taken from five streams leading out of the Impact Area, as access to the Impact Area was restricted. Sample

**Table 9- Analytical Results: Wastewater Sludge Lagoon Area Soil Samples, WW-SBMW9
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Water Table Concentration (ppm)	Ground Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	6/28/96	335.2	0.07	None Detected	1000
Total Phosphorous	6/28/96	365.2	None Detected	11	N/A
Pesticides	6/28/96	8081	None Detected	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/28/96	8081	None Detected	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/28/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 1.6 Barium-15 Beryllium- 0.38 Chromium- 6.0 Lead- ND Nickel- 5.6 Vanadium- 6.6 Zinc- 6 Others Not Detected	Arsenic- 4.3 Barium- 71 Beryllium- 0.45 Chromium- 13 Lead- 16 Nickel- 14 Vanadium- 20 Zinc- 47 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 118.6 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 9- Analytical Results: Wastewater Sludge Lagoon Area Soil Samples, WW-SBMW10
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Water Table Concentration (ppm)	Ground Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	6/28/96	335.2	None Detected	0.42	1000
Total Phosphorous	6/28/96	365.2	None Detected	99	N/A
Pesticides	6/28/96	8081	None Detected	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/28/96	8081	None Detected	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/28/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 4.3 Barium- 140 Beryllium- 0.82 Chromium- 18 Lead- 17 Nickel- 19 Vanadium- 36 Zinc- 76 Others Not Detected	Arsenic- 5.9 Barium- 140 Beryllium- 0.77 Chromium- 17 Lead- 19 Nickel- 20 Vanadium- 28 Zinc- 72 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 118.6 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 9- Analytical Results: Wastewater Sludge Lagoon Area Soil Samples, WW-SBMW11
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Water Table Concentration (ppm)	Ground Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	6/28/96	335.2	None Detected	0.24	1000
Total Phosphorous	6/28/96	365.2	None Detected	230	N/A
Pesticides	6/28/96	8081	None Detected	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/28/96	8081	None Detected	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/28/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 5.7 Barium- 59 Beryllium- 0.64 Chromium- 12 Lead- 16 Nickel- 14 Silver- 0.90 Vanadium- 21 Zinc- 63 Others Not Detected	Arsenic- 3.6 Barium- 110 Beryllium- 0.79 Chromium- 16 Lead- 22 Nickel- 15 Silver- ND Vanadium- 25 Zinc- 55 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 118.6 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Silver- 7,300 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 9- Analytical Results: Wastewater Sludge Lagoon Area Soil Samples, WW-SBMW11-DUP
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	6/28/96	335.2	None Detected	1000
Total Phosphorous	6/28/96	365.2	48	N/A
Pesticides	6/28/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/28/96	8081	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/28/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 2.5 Barium- 78 Beryllium- 0.55 Chromium- 12 Lead- 20 Nickel- 11 Silver- ND Vanadium- 18 Zinc- 47 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 118.6 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Silver- 7,300 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 10- Analytical Results: Wash Rack Area Soil Samples, WR-SS1
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Total Petroleum Hydrocarbons	6/26/96	418.1	0 to 0.5 feet: 97 Duplicate: 83	N/A
Gasoline Range Organics	6/26/96	WISC.GRO	None Detected	N/A
Diesel Range Organics	6/26/96	WISC.DRO	None Detected	N/A
Semi- Volatile Organic Compounds	Not Sampled	8270	Not Sampled	Varies (see Appendix B)
Volatile Organic Compounds	Not Sampled	8260	Not Sampled	Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 10- Analytical Results: Wash Rack Area Soil Samples, WR-SS2
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Total Petroleum Hydrocarbons	6/26/96	418.1	0 to 0.5 feet: 19,000 1.0 to 1.5 feet: 100	N/A
Gasoline Range Organics	6/26/96	WISC.GRO	None Detected	N/A
Diesel Range Organics	6/26/96	WISC.DRO	0 to 0.5 feet: 230	N/A
Semi- Volatile Organic Compounds	8/20/96	8270	0 to 0.5 feet: bis-2(ethylhexyl) phthalate: 0.66 Others Not Detected	bis-2(ethylhexyl) phthalate: 4,142 Varies (see Appendix B)
Volatile Organic Compounds	8/20/96	8260	0 to 0.5 feet: None Detected	Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 10- Analytical Results: Wash Rack Area Soil Samples, WR-SS3
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Total Petroleum Hydrocarbons	6/26/96	418.1	0 to 0.5 feet: 200 1.0-1.5 feet: 150 2.0 to 2.5 feet: 14	N/A
Gasoline Range Organics	6/26/96	WISC.GRO	None Detected	N/A
Diesel Range Organics	6/26/96	WISC.DRO	None Detected	N/A
Semi- Volatile Organic Compounds	8/20/96	8270	None Detected	Varies (see Appendix B)
Volatile Organic Compounds	8/20/96	8260	None Detected	Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 10- Analytical Results: Wash Rack Area Soil Samples, WR-SS4
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Total Petroleum Hydrocarbons	6/26/96	418.1	0 to 0.5 feet: 35	N/A
Gasoline Range Organics	6/26/96	WISC.GRO	None Detected	N/A
Diesel Range Organics	6/26/96	WISC.DRO	0 to 0.5 feet: 5.3	N/A
Semi- Volatile Organic Compounds	Not Sampled	8270	Not Sampled	Varies (see Appendix B)
Volatile Organic Compounds	Not Sampled	8260	Not Sampled	Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 10- Analytical Results: Wash Rack Area Soil Samples, WR-SS5
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Total Petroleum Hydrocarbons	6/26/96	418.1	0 to 0.5 feet: 110 1.0-1.5 feet: 180 2.0-2.5 feet: 160	N/A
Gasoline Range Organics	6/26/96	WISC.GRO	None Detected	N/A
Diesel Range Organics	6/26/96	WISC.DRO	None Detected	N/A
Semi- Volatile Organic Compounds	8/20/96	8270	None Detected	Varies (see Appendix B)
Volatile Organic Compunds	8/20/96	8260	None Detected	Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

locations are shown in Figure 3. Samples were collected and analyzed in accordance with procedures set forth in the FSP.

Sediment samples from the five streams were analyzed for cyanide, total phosphorous, VOCs, pesticides, SVOCs, OP pesticides, chlorinated herbicides, and metals. Sample results are summarized in Table 11. No analyte was detected in concentrations exceeding IDEM VRP Tier II Non-residential Cleanup Criteria. Analytical data and analyte lists are presented in Appendix F.

4.4 SOIL/SLUDGE SAMPLING RESULTS

Soil/sludge samples were obtained from the Wastewater Sludge Lagoon Area by means of a hand auger. Sample concentrations for contaminants of concern were compared to IDEM VRP Tier II Non-residential Cleanup Criteria for surface soils. Results of the sampling are presented in the following section.

4.4.1 Wastewater Sludge Lagoon Area

Three soil/sludge samples (WW-SS1, WW-SS2, and WW-SS3) were collected by hand auger from the Wastewater Sludge Lagoon Area. Locations of the samples are shown in Figure 5. The samples were collected in accordance with procedures set forth in the FSP.

Samples were analyzed for cyanide, total phosphorous, VOCs, pesticides, PCBs, SVOCs, OP pesticides, chlorinated herbicides, and metals. No sample point contained contaminants in concentrations above IDEM VRP Tier II Non-residential Cleanup Criteria. Analytical results are summarized in Table 12. Analytical data and analyte lists are presented in Appendix F.

4.5 DATA VALIDATION

Laboratory analysis for this site investigation was performed by Trace Analytical Laboratories of Muskegon, Michigan. Laboratory data was validated by qualified Montgomery Watson personnel according to procedures set forth in the QAPjP. It was determined that all laboratory data received for this SI was valid under the specifications of the QAPjP, IDEM regulations, and the scope of this project. A complete laboratory data validation report is given in Appendix H.

Table 11- Analytical Results: Impact Area Sediment Samples, IA-SD1-000
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	1000
Total Phosphorous	6/25/96	365.2	210	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 0.55 Barium- 9.5 Chromium- 3.4 Lead- 4.7 Nickel- 3.4 Vanadium- 7.1 Zinc- 13 Others Not Detected	Arsenic- 612 Barium- 10,000 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 11- Analytical Results: Impact Area Sediment Samples, IA-SD1-000-DUP
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	1000
Total Phosphorous	6/25/96	365.2	100	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	bis(2- ethylhexyl)phthalate- .460 Others Not Detected	bis(2- ethylhexyl)phthalate- 4142.86 Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 0.68 Barium- 5.5 Chromium- 3.1 Lead- 2.8 Nickel- 2.7 Vanadium- 4.4 Zinc- 8.6 Others Not Detected	Arsenic- 612 Barium- 10,000 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

Table 11- Analytical Results: Impact Area Sediment Samples, IA-SD2-000
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	1000
Total Phosphorous	6/25/96	365.2	28	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 2.4 Barium- 9.7 Chromium- 12 Lead- 3.2 Nickel- 8.7 Vanadium- 8.1 Zinc- 13 Others Not Detected	Arsenic- 612 Barium- 10,000 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

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**Table 11- Analytical Results: Sediment Samples, Impact Area, IA-SD4-000
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	8/20/96	335.2	Not Detected	1000
Total Phosphorous	6/25/96	365.2	22	N/A
Volatile Organic Compounds	6/25/96	8260	None Detected	Varies (see Appendix B)
Pesticides	6/25/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/25/96	8081	None Detected	Varies (see Appendix B)
Semi-Volatile Organic Compounds	6/25/96	8270	None Detected	Varies (see Appendix B)
Organophosphorous Pesticides	6/25/96	8140	None Detected	Varies (see Appendix B)
Chlorinated Herbicides	6/25/96	8150	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/25/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 2.2 Barium- 23 Beryllium- 0.27 Chromium- 6.5 Lead- 7.2 Nickel- 4.7 Vanadium- 9.4 Zinc- 13 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 13.49 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance

**Table 12- Analytical Results: Wastewater Sludge Lagoon Area Soil/Sludge Samples, WW-SS1
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	6/28/96	335.2	None Detected	1000
Total Phosphorous	6/28/96	365.2	790	N/A
Pesticides	6/28/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/28/96	8081	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/28/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 2.9 Barium- 250 Beryllium- 0.49 Chromium- 21 Lead- 62 Nickel- 15 Selenium- 1.0 Vanadium- 16 Zinc- 400 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 118.6 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Selenium- 7,300 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 12- Analytical Results: Wastewater Sludge Lagoon Area Soil/Sludge Samples, WW-SS2
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	6/28/96	335.2	None Detected	1000
Total Phosphorous	6/28/96	365.2	280	N/A
Pesticides	6/28/96	8081	None Detected	Varies (see Appendix B)
Polychlorinated Biphenyls	6/28/96	8081	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/28/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 3.3 Barium- 100 Beryllium- 0.58 Chromium- 15 Lead- 20 Nickel- 14 Vanadium- 22 Zinc- 79 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 118.6 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 12- Analytical Results: Wastewater Sludge Lagoon Area Soil/Sludge Samples, WW-SS3
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	6/28/96	335.2	0.36	1000
Total Phosphorous	6/28/96	365.2	8,900	N/A
Pesticides	6/28/96	8081	4,4'-DDE: 0.057 4,4'-DDD: 0.027 4,4'-DDT: 0.200 Others Not Detected	4,4'-DDE: 80.49 4,4'-DDD: 48.34 4,4'-DDT: 141.83 Varies (see Appendix B)
Polychlorinated Biphenyls	6/28/96	8081	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/28/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 3.6 Barium- 110 Beryllium- 0.79 Chromium- 16 Lead- 22 Nickel- 15 Vanadium- 25 Zinc- 55 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 118.6 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

**Table 12- Analytical Results: Wastewater Sludge Lagoon Area Soil/Sludge Samples, WW-SS3-DUP
Camp Atterbury Reserve Forces Training Area
Edinburgh, Indiana**

Analyte	Sample Date	EPA Method Number	Concentration (ppm)	IDEM Tier II Non-Residential Cleanup Criteria (ppm)
Cyanide	6/28/96	335.2	None Detected	1000
Total Phosphorous	6/28/96	365.2	8,900	N/A
Pesticides	6/28/96	8081	4,4'-DDE: 0.057 4,4'-DDD: 0.027 4,4'-DDT: 0.200 Others Not Detected	4,4'-DDE: 80.49 4,4'-DDD: 48.34 4,4'-DDT: 141.83 Varies (see Appendix B)
Polychlorinated Biphenyls	6/28/96	8081	None Detected	Varies (see Appendix B)
Metals (See Appendix F)	6/28/96	6010, 7060, 7740, 7041, 7131, 7421, 7470, 7841	Arsenic- 3.6 Barium- 110 Beryllium- 0.79 Chromium- 16 Lead- 22 Nickel- 15 Vanadium- 25 Zinc- 55 Others Not Detected	Arsenic- 612 Barium- 10,000 Beryllium- 118.6 Chromium- 10,000 Lead- 1,000 Nickel- 10,000 Vanadium- 10,000 Zinc- 10,000 Varies (see Appendix B)

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Note: IDEM Tier II Criteria from IDEM Voluntary Remediation Program Resource Guide, July 1996.

N/A- Not Applicable

Not/None Detected- Concentrations of IDEM regulated analytes below preset detection limits specified in the Quality Assurance Project Plan (QAPjP), Montgomery Watson, April 1996

5.0 CONCLUSIONS

5.1 IMPACT AREA

In order to characterize possible contamination migrating from the Impact Area, five sediment samples were collected from five separate streams leaving the area. No sample showed impact above IDEM VRP Tier II Non-residential Cleanup Criteria. Groundwater in the area was assessed by monitoring wells MW7 and MW8. Samples from the wells showed no adverse impact to groundwater, and confirmed the prevailing groundwater flow direction to be towards the southeast. The mean hydraulic conductivity assessed through slug testing of the wells was determined to be 20.4 ft per day.

5.2 BATTERY DISPOSAL AREAS

Groundwater samples were obtained from monitoring wells MW12, MW13, and MW14 in the Battery Disposal Areas. Additionally, soil samples were obtained from borings in the areas and from samples collected during monitoring well installation. No samples were determined to be impacted above IDEM VRP Tier II Non-residential Cleanup Criteria. The groundwater in the areas was determined to lie in a separate formation from the other investigated portions of Camp Atterbury, based on soils characterization and slug testing. Prevailing groundwater flow direction in the region was determined to be to the east. The mean hydraulic conductivity was determined to be 0.92 ft per day.

5.3 WASTEWATER SLUDGE LAGOON AREA

Groundwater samples were collected from the Wastewater Sludge Lagoon Area from monitoring wells MW9, MW10, and MW11. Soil samples were collected from the installed monitoring wells, and soil/sludge samples were collected from the two wastewater lagoons. No sample contained contaminants above IDEM VRP Tier II Non-residential Cleanup Criteria. Prevailing groundwater flow direction in the area was determined to be to the east-southeast, and hydraulic conductivity of the aquifer was estimated as 20.4 ft per day, as previously discussed.

5.4 OLD LANDFILL AREA

Groundwater quality was assessed in areas around the Old Landfill Area through sampling of monitoring wells MW01, MW6, and MW7. No samples from these wells exhibited concentrations greater than IDEM VRP Tier II Non-residential Cleanup Criteria. Prevailing groundwater flow direction was determined to be to the east-southeast, and hydraulic conductivity of the aquifer was estimated at 20.4 ft per day.

5.5 WASH RACK AREA

Soil samples were taken in the Wash Rack Area from five borings. Samples were submitted for laboratory analysis, and no sample exhibited contamination in concentrations greater than IDEM VRP Tier II Non-residential Cleanup Criteria.

6.0 RECOMMENDATIONS

This SI has determined that constituents for which soil, groundwater, and sediments were analyzed are below IDEM VRP Tier II Non-residential Cleanup Criteria at the five potential areas of concern at Camp Atterbury. It is the recommendation of Montgomery Watson that activities from this SI proceed directly into the execution of decision documents for each area of concern, which state that based on the results of this investigation (i.e.- contaminants were not detected and/or contaminant levels are below IDEM VRP Tier II Non-residential Cleanup Standards), no further action is required.

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Appendix A



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IDEM AND MDI CORRESPONDENCE



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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Kathy Prosser
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100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015
Telephone 317-232-8603
Environmental Helpline 1-800-451-6027

July 18, 1995

Mr. John W. Orr
Attn: MDI-FMO-SES
2002 South Holt Road
Indianapolis, Indiana 46241-4839

Dear Mr. Orr:

Re: Review of Preliminary Assessment, Atterbury
Reserve Forces Training Area

Staff of the Indiana Department of Environmental Management have reviewed the Preliminary Assessment for the Atterbury Reserve Forces Training Area (dated September 1993). The review was completed under the Defense Environmental Restoration Program.

The Preliminary Assessment is essentially reasonable and appropriate for the type of work that was contracted. As expected in a Preliminary Assessment, the recommendations outlined in the report lack specific methods and procedures on how to accomplish the recommended plan of action. Formulation of specific work plans are needed prior to initiation of the recommended site work. IDEM staff have the following comments.

Section 2.1:

As a minor point, the report contains several inconsistencies regarding site location. The boundaries of the site do not match between the Property Location Map (Figure 2-1) and the ARFTA Installation Map (Figure 2-2). Also, on page 2-1, the highways that are described as bounding the site do not do so. In some cases, these highways are actually miles from the site boundary. U. S. Highway 31 is to the east of the site, not U. S. Highway 1. Corrections should be made in future submittals.

Sections 4.2 and 4.3:

If armor piercing projectiles or anti-tank shells containing depleted uranium were used in the impact area or air-to-ground impact range, the Army should address this issue.

Section 4.8:

Waste oil USTs must be closed in accordance with applicable regulations and IDEM guidance.

Section 5.5:

The recommended comprehensive hydrogeological study should be conducted before any monitoring wells are installed in the vicinity of either the Old Landfill or New Landfill. The seriousness of the threat to the shallow private wells located along Wallace Road cannot be determined from the information provided in the report. Thus, the locations of recommended monitoring wells along Wallace Road is dependent upon the findings of the hydrogeological study.

Section 6.2:

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The description of the 15-mile surface-water pathway was not very complete. The East Fork of Salt Creek does not flow into the Driftwood River as stated, nor does it drain the southeastern corner of the site. The Salt Creek Drainage basin covers the southwestern portion of the site and flows toward the southwest to Lake Monroe, eventually discharging into the East Fork of the White River near Bedford.

Section 7:

Weston noted that waste oils were mixed with chlorinated solvents and sprayed on roads for dust control. At a minimum, the Army should randomly sample areas where waste oils were sprayed, or where other significant hydrocarbon releases (fuel spills) have occurred. Sampling of roads should include PCB screening.

Section 7.7:

Vehicle wash racks:

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In vehicle wash areas, proper assessment protocols dictate that the recommended one shallow sample is inadequate for the four wash rack areas. At a minimum, multiple non-composite samples are needed to characterize the area. The samples should be obtained from the zones expected to be potentially contaminated, where the highest flame ionization detector or organic vapor analyzer readings are detected. In addition, stained soils in the vicinity of washracks (unrelated to oil/water separators) should be sampled.

Old Landfill:

In addition to Weston's conclusions and recommendations, locations of other possible abandoned landfills should be determined. Because the facility opened in 1942 and the Old Landfill reportedly opened in 1969, all locations used for disposal of Camp Atterbury refuse between 1942 and 1969 should be determined.

Impact Areas:

In addition to TAL and TCL analyses, IDEM staff recommend sampling sediments for explosives. Surface water sampling in these areas should also be included.

Battery Disposal Areas:

In the battery disposal area, IDEM staff recommend using Indiana Tier I Voluntary Cleanup Criteria, which are equal to the background mean value plus three times the standard deviation, calculated in the following manner:

For surface soils, background can be established by collecting samples from the upper two feet of soil at a minimum of four locations in the vicinity of the site. Samples should be collected at 6 inch intervals (0-6", 6-12", 12-18", and 18-24") and the depth intervals combined into one composite sample from each location for laboratory analysis. The laboratory results from the four (or more) composite samples will then serve as the database for statistical computation.

Background levels for subsurface soils will consist of laboratory analyses of samples collected from the same soil layer slated for investigation or remediation. If multiple soil layers will be subjected to investigation or remediation, then samples must be collected from each layer. A minimum of four samples must be collected from different locations within each layer. The samples must then be subjected to laboratory analysis and these results will serve as the database for statistical computation. Tier I levels will be established for each appropriate soil layer using these techniques.

From a cost and time standpoint, it would be advantageous to excavate the affected areas, neutralize the soil during excavation, and field analyze for leachable lead and pH to determine the limits of the excavation. Laboratory analysis would then be required for confirmation of excavation limits. Soil exceeding cleanup criteria would require appropriate disposal as hazardous or special waste.

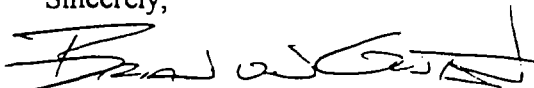
CAIS Area:

Based on the hazardous nature of sampling in areas with unexploded ordnance, monitoring of surface water, sediments, and groundwater at the perimeter should provide sufficient sentinel protection.

Defense Environmental Restoration Program personnel look forward to increased involvement with the environmental work at ARFTA. Please contact me at (317)233-6333 if you have any questions.

308-3133

Sincerely,



Brian von Gunten, Project Manager

Defense Environmental Restoration Program
Office of Environmental Response

cc: Rex Osborn, IDEM



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015
Telephone 317-232-8603
Environmental Helpline 1-800-451-6027

June 10, 1996

Mr. John W. Orr
Attn: MDI-FMO-SES
2002 South Holt Road
Indianapolis, Indiana 46241-4839

Dear Mr. Orr:

Re: Review of Draft SAP, Site Investigation
Atterbury Reserve Forces Training Area

Staff of the Indiana Department of Environmental Management have reviewed the Draft Field Sampling Plan for Site Investigation Activities for the Atterbury Reserve Forces Training Area (dated April 1996). The document was received on 10 May 1996; review was completed by personnel associated with the Defense Environmental Restoration Program.

In general, the work plan was to have been based upon results of the Preliminary Assessment conducted by Weston (1993), and was to have incorporated IDEM staff comments (18 July 1995) to Weston's work. The proposed field sampling plan did not address several areas of concern noted by Weston and/or IDEM staff. IDEM staff do not wish to hinder the proposed field investigation schedule by drastically changing its current scope, and therefore suggest that the remaining areas of concern be addressed in a supplemental effort in the future.

Areas of concern not adequately addressed by the proposed investigation include:

A) Other areas where landfills may exist:

As the Old Landfill reportedly opened in 1969, it is probable that refuse was placed at other on-site locations between 1942 and 1969. Perhaps refuse was used to fill low lying areas. IDEM staff recommend examining historical aerial photographs, which may provide evidence that refuse was placed in other areas. During informal conversations with personnel previously associated with the facility, two additional landfills were reported. While the reports, at this point, are hearsay, IDEM staff continue to question the notion that the Old Landfill was the only site of historical waste disposal.

B) Areas where waste oils/chlorinated solvents were used for dust control:

At a minimum, random sampling of areas where waste oils were sprayed or where hydrocarbons were otherwise released is appropriate.

- (C) Suspected Agent Burning Area:
It was reported that twenty-five 1-gallon cans of unknown material, potentially representing chemical warfare agents or support compound, were burned. Weston proposed that a soil sampling plan be formulated to include analyses for pure product, combustion and hydrolysis breakdown products, and common chlorinates.
- D) CAIS Area:
Considering the area is in an active Impact Area, perimeter monitoring of the Impact Area (surface water, sediments, groundwater) is appropriate to evaluate possible environmental effects.
- E) Waste Oil Underground Storage Tanks:
When removed, waste oil USTs must be closed in accordance with applicable regulations.

Section 4.1, Old Landfill, pages 27-29:

Weston reported that, from approximately 1969, the Old Landfill was a repository of asbestos, solvents, petroleum products, pentachlorophenol, and other miscellaneous wastes. The current field sampling plan states that the landfill was operated from the 1970's, and the landfill contents were derived from the demolition and burning of surplus site barracks. Also, a former incinerator is located next to the landfill. The sampling plan does not propose sampling or geophysical work that would locate the landfill and identify its contents. Borings within the boundaries of the landfill are appropriate to evaluate landfill contents, subsurface soil, and groundwater.

Even though the proposed wells are not to be located in potential source areas, field screening is appropriate. If total organics exceed 10 ppm on field instruments, soil samples should be collected for laboratory analysis.

Section 4.2, Impact Area, pages 29-30:

The SAP proposes to sample sediments within five drainage pathways emanating eastward from the impact areas. The maps provided do not show the drainage pathways. A review of topographic quadrangles shows that a southwest oriented drainage pathway also emanates near the interpreted southwest corner. If additional drainage pathways originate from the impact areas, they must also be sampled to adequately characterize the area.

As previously recommended by IDEM staff, any historical use of ordnance containing depleted uranium should be addressed. If depleted uranium was used, sediment samples should be evaluated for radioactivity. Due to the presence of New Albany Shale, naturally occurring radioactive isotopes may be present. Any evaluation for radioactivity must include a comparison to background.

Page 3

Mr. John W. Orr

Section 4.3, Battery Disposal Areas, pages- 30-34:

The single boring proposed at each discharge location will only characterize the presumed maximum concentration of contaminants; it will not delineate extent. From a cost and time standpoint, it may be advantageous to forego further investigation and proceed with a presumptive remedy. IDEM staff suggest excavating the affected areas (Weston previously noted stained soils at depths of six to eight feet), neutralizing the soils during excavation, and field analyzing for leachable lead and pH to determine the limits of excavation and appropriate disposal.

Section 4.5, pages 36-37:

IDEM staff agree that it is appropriate to include this as an area of concern, and recommend additional sampling. It is appropriate to collect soil, surface water, and sediment from the area of each lagoon's outfall.

In summary, the current proposal provides an adequate scope of work for the Vehicle Wash Areas and the New Landfill. Otherwise, the plan outlines only initial sampling activities, in only some of the areas of concern. With the exception of the Vehicle Wash Areas, the Impact Areas, and the New Landfill, it does not propose to delineate areas of contamination. IDEM staff do not consider the proposed work comprehensive. A significant quantity of additional work will be necessary to adequately assess all areas of known or suspected contamination.

Please provide the field schedule as soon as it becomes available. IDEM staff intend to oversee a portion of site work, and may collect split samples to verify data quality. You may contact me at (317) 308-3133 if you have any questions.

Sincerely,



Brian von Gunten, Project Manager
Defense Environmental Restoration Program

cc: Rex Osborn, IDEM

Appendix B



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**IDEM TIER II NON-RESIDENTIAL
CLEANUP CRITERIA**

TABLE 14
SUMMARY OF TIER II CLEANUP GOALS
FOR THE NONRESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
naphthalene	no	10,000.00	10,000.00	4.0880
acenaphthylene	no	NA	NA	NA
acenaphthene	no	10,000.00	10,000.00	6.1320
fluorene	no	10,000.00	10,000.00	4.0880
phenanthrene	no	NA	NA	NA
anthracene	no	10,000.00	10,000.00	30.6600
fluoranthene	yes	10,000.00	10,000.00	0.8176
pyrene	no	10,000.00	10,000.00	3.0660
benzo(a)anthracene*	yes	79.45	103.88	0.0100
chrysene*	yes	7,945.21	10,000.00	0.3918
benzo(b)fluoranthene*	yes	79.45	354.98	0.0100
benzo(k)fluoranthene*	yes	794.52	3,759.12	0.0392
benzo(a)pyrene	yes	7.94	69.85	0.0100
indeno(1,2,3-cd)pyrene*	yes	79.45	629.17	0.0100
dibenzo(a,h)anthracene*	yes	7.95	69.86	0.0100
benzo(g,h,i)perylene	yes	NA	NA	NA
3,3'-dichlorobenzidine	no	128.89	12.86	0.0200
n-nitroso-di-n-propylamine	no	8.29	0.66	0.0100
bis(2-chloroisopropyl)ether	no	93.12	1.32	0.0409
4-chloroaniline	no	8,160.00	1,117.69	0.4088
2-chloronaphthalene	no	10,000.00	10,000.00	8.1760
2,4-dinitrotoluene	no	4,080.00	39.07	0.2044
hexachlorobutadiene	yes	1.78	31.18	0.0367
hexachloroethane	yes	408.00	3.31	0.0204
isophorone	no	10,000.00	256.03	3.0105
benzyl alcohol	no	10,000.00	4,356.75	30.6600
bis(2-chloroethyl)ether	no	4.06	0.66	0.0100

TABLE 14
SUMMARY OF TIER II CLEANUP GOALS
FOR THE NONRESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
nitrobenzene	no	1,020.00	1.73	0.0511
1,2-dichlorobenzene	no	10,000.00	10,000.00	9.1980
1,3-dichlorobenzene	no	NA	NA	NA
1,4-dichlorobenzene	no	2,416.67	34.67	0.1192
1,2,4-trichlorobenzene	no	10,000.00	1,405.37	1.0220
hexachlorobenzene	no	6.87	101.56	0.0100
hexachlorocyclopentadiene	no	2.02	2.89	0.7154
n-nitrosodiphenylamine	no	10,000.00	567.80	0.5837
benzoic acid	no	10,000.00	10,000.00	408.8000
2-nitroaniline	no	42.90	3.30	0.0500
phenol	yes	10,000.00	658.78	12.2640
2-methylphenol	no	10,000.00	375.93	5.1100
3-methylphenol	no	NA	NA	NA
4-methylphenol	no	10,000.00	427.24	5.1100
2-chlorophenol	no	10,000.00	11.63	0.5110
2,4-dichlorophenol	no	6,120.00	15.12	0.3066
2,4,5-trichlorophenol	no	10,000.00	5,507.44	10.2200
2,4,6-trichlorophenol	no	1,922.89	30.65	0.2600
pentachlorophenol	no	483.33	24.95	0.0500
2,4-dinitrophenol	no	4,080.00	7.37	0.2044
bis(2-ethylhexyl)phthalate	yes	4,142.86	1,406.25	0.2043
butylbenzylphthalate	no	10,000.00	10,000.00	20.4400
di-n-butylphthalate	yes	10,000.00	6,188.56	2.0440
diethylphthalate	no	10,000.00	10,000.00	81.7600
di methyl phthalate	no	10,000.00	10,000.00	1,022.0000
di-n-octyl phthalate	no	10,000.00	10,000.00	2.0440
benzene	no	16.63	4.77	0.0986

TABLE 14
SUMMARY OF TIER II CLEANUP GOALS
FOR THE NONRESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
toluene	no	1,000.00	1,000.00	20.4400
ethylbenzene	no	1,000.00	1,000.00	10.2200
xylene	no	1,000.00	1,000.00	204.4000
vinyl chloride	no	0.02	0.13	0.0100
chloroethane	no	1,000.00	1,000.00	NA
1,1-dichloroethylene	no	0.15	0.08	0.0070
1,1-dichloroethane	no	973.47	1,000.00	10.2200
1,2-dichloroethylene (cis)	no	1,000.00	102.49	1.0220
1,2-dichloroethane	no	5.27	0.37	0.0314
trichloroethylene	no	24.97	25.73	0.2600
1,1,1-trichloroethane	no	1,000.00	1,000.00	9.1980
1,1,2-trichloroethane	no	22.74	1.05	0.0502
tetrachloroethylene	no	101.23	8.01	0.0561
1,1,1,2-tetrachloroethane	no	75.91	7.24	0.1100
1,1,2,2-tetrachloroethane	no	75.41	0.21	0.0143
chloroform	no	5.28	20.33	0.4689
acetone	no	1,000.00	136.29	10.2200
4-methyl-2-pentanone	no	1,000.00	407.48	5.1100
methyl ethyl ketone	no	1,000.00	146.24	5.1100
Aldrin	yes	0.27	0.06	0.0002
gamma-BHC (Lindane)	yes	44.62	0.34	0.0022
chlordane	yes	24.48	4.51	0.0020
DDD	yes	241.67	48.34	0.0119
DDE	yes	170.59	80.49	0.0084
DDT	yes	153.01	141.83	0.0084
dieldrin	yes	3.63	0.06	0.0002
endosulfan sulfate	no	102.00	12.00	0.0051

TABLE 14
SUMMARY OF TIER II CLEANUP GOALS
FOR THE NONRESIDENTIAL SCENARIO

Chemical Name	Compound is Bioaccumulatable [*] (yes/no)	Surface Soils (mg/Kg)	Subsurface Soils (mg/Kg)	Groundwater (mg/L)
endrin	yes	122.40	10.12	0.0061
heptachlor	yes	4.16	0.44	0.0006
heptachlor epoxide	no	6.37	0.45	0.0008
PCBs	yes	7.53	4.23	0.0007
lead	no	NA	NA	NA
cadmium	no	1,020.00	730.00	0.0511
silver	no	10,000.00	7,300.00	0.5110
mercury	yes	122.40	87.60	0.0061
chromium vi	no	10,000.00	7,300.00	0.5110
chromium iii	no	10,000.00	10,000.00	102.2000
barium	no	10,000.00	10,000.00	7.1540
arsenic	no	612.00	438.00	0.0500
antimony	no	816.00	584.00	0.0600
beryllium	no	13.49	118.60	0.0050
cyanide	no	1,000.00	10,000.00	2.0440
nickel	no	10,000.00	10,000.00	2.0440
selenium	no	10,000.00	7,300.00	0.5110
vanadium	no	10,000.00	10,000.00	0.7154
zinc	no	10,000.00	10,000.00	30.6600

NOTES: a - Compounds that are assumed to be bioaccumulative have an acceptable hazard index of 0.2 versus 1, as determined based on Indiana Register, 16:7, April 1, 1993.

b - Practical quantitation limits based EPA SW-846, 1986 for GC/MS. PQLs will change according to the specific analytical method used.

* - Assumes TEF approach.

NA - Data not available or not applicable.

Appendix C



MWH
MONTGOMERY WATSON HARZA

C

WELL CONSTRUCTION DATA



FLUSH MOUNT MONITORING WELL

CONSTRUCTION SUMMARY

JOB NO. 416210704

City/Project Name <u>Camp Atherbury</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name <u>MW6</u>
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/>	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E.	Date Well Installed <u>27 June 96</u>
Distance Well Is From Waste/Source Boundary ft. _____	Section Location of Waste/Source <input type="checkbox"/> E. <input type="checkbox"/> W. Location of Well Relative to Waste/Source <input type="checkbox"/> Upgradient <input type="checkbox"/> Sidegradient <input type="checkbox"/> Downgradient <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) (Geologist) <u>MEV</u> (Driller) <u>Ron / American</u>

Watertight Cover elevation _____ ft. MSL	Bolt down water tight cover.
Well casing top elevation _____ ft. MSL	Inside Diameter: _____ (in.) Length _____ (in.)
Land surface elevation _____ ft. MSL	Water tight well cap? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Seal, bottom _____ ft. MSL or <u>1.0</u> ft.	Lock? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

USCS classification of soil near screen:

GP <input type="checkbox"/>	GM <input type="checkbox"/>	GC <input type="checkbox"/>	GW <input type="checkbox"/>	SW <input type="checkbox"/>	SP <input type="checkbox"/>
SM <input checked="" type="checkbox"/>	SC <input type="checkbox"/>	ML <input type="checkbox"/>	MH <input type="checkbox"/>	CL <input type="checkbox"/>	CH <input type="checkbox"/>

Bedrock ☐

Sieve analysis attached? ☐ Yes ☒ No

Drilling method used: Rotary ☐
4 1/4" Hollow Stem Auger ☒
Other ☐

Drilling fluid used: Water ☐ Air ☐
Drilling Mud ☐ None ☒

Drilling additives used? ☐ Yes ☒ No

Describe _____

Source of water: _____

	ELEVATION	DEPTH
Bentonite seal, top	ft. MSL or _____	<u>7.3</u> ft.
Fine sand, top	ft. MSL or _____	ft.
Filter pack, top	ft. MSL or _____	<u>8.3</u> ft.
Screen joint, top	ft. MSL or _____	<u>10</u> ft.
Well bottom	ft. MSL or _____	<u>20</u> ft.
Filter pack, bottom	ft. MSL or _____	<u>20</u> ft.
Borehole, bottom	ft. MSL or _____	<u>20</u> ft.
Borehole, diameter	in.	
O.D. well casing	in.	
I.D. well casing	in.	

Surficial Seal: Concrete ☒
Bentonite ☐

Sand Drainage? Yes ☐ No ☒

Material between well casing and protective pipe:
Bentonite ☒
Annular space seal ☐
Other ☐

Annular space seal: Granular Bentonite ☐
Lbs/gal mud weight... Bentonite-sand slurry ☐
Lbs/gal mud weight... Bentonite slurry ☒
% Bentonite... Bentonite-cement grout ☐
cu ft volume added for any of the above _____

How installed: Tremie ☐
Tremie pumped ☒
Gravity ☐
Bentonite granules ☐
Bentonite pellets ☒
Other ☐

Bentonite seal: ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in.
Baroid Hole Plug

Fine sand material: Manufacturer, product name & mesh size _____

Volume added 2.5 cu ft

Filter pack material: Manufacturer, product name & mesh size
Global Filter Pack #5

Volume added 2.5 cu ft

Well casing: Flush threaded PVC schedule 40 ☒
Flush threaded PVC schedule 80 ☐
Other ☐

Screen material: PVC

Screen type: Factory cut ☒
Continuous slot ☐
Other ☐

Manufacturer Laibc

Slot size: 0.010 in.

Slotted length: 10 ft.

Backfill material (below filter pack): None ☒
Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____ Firm _____

Montgomery Watson

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Note: Sand locked
25 gal H₂O
to free c

Bentonite locked 50 gal H₂O added.

FLUSH MOUNT MONITORING WELL
CONSTRUCTION SUMMARY

JOB NO. 4162.0204

Facility/Project Name <u>Camp Atherbury</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. ft. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name <u>MW7</u>
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/>	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E. _____	Date Well Installed <u>25 June 96</u>
Distance Well Is From Waste/Source Boundary ft. _____	Section Location of Waste/Source <input type="checkbox"/> E. <input type="checkbox"/> W. Location of Well Relative to Waste/Source <input type="checkbox"/> Upgradient <input type="checkbox"/> Sidegradient <input type="checkbox"/> Downgradient <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) (Geologist) <u>MEV</u> (Driller) <u>Ron / American</u>

Watertight Cover elevation _____ ft. MSL	Bolt down water tight cover.
Well casing top elevation _____ ft. MSL	Inside Diameter: _____ (in.) Length _____ (in.)
Land surface elevation _____ ft. MSL	Water tight well cap? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Lock? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Seal, bottom _____ ft. MSL or _____ ft.	Surficial Seal: Concrete <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/>
USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input checked="" type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/>	Sand Drainage? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Sieve analysis attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Material between well casing and protective pipe: Bentonite <input checked="" type="checkbox"/> Annular space seal <input type="checkbox"/> Other <input type="checkbox"/>
Drilling method used: Rotary <input type="checkbox"/> <u>4 1/4" Hollow Stem Auger</u> <input checked="" type="checkbox"/> Other <input type="checkbox"/>	Annular space seal: Granular Bentonite <input type="checkbox"/> Lbs/gal mud weight... Bentonite-sand slurry <input type="checkbox"/> Lbs/gal mud weight... Bentonite slurry <input checked="" type="checkbox"/> % Bentonite... Bentonite-cement grout <input type="checkbox"/> cu ft volume added for any of the above _____
Drilling fluid used: Water <input type="checkbox"/> Air <input type="checkbox"/> Drilling Mud <input type="checkbox"/> None <input checked="" type="checkbox"/>	How installed: Tremie <input type="checkbox"/> Tremie pumped <input checked="" type="checkbox"/> Gravity <input type="checkbox"/>
Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Bentonite seal: <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. <u>CETCO Pure Gold Chips</u> <input checked="" type="checkbox"/> Fine sand material: Manufacturer, product name & mesh size _____
Describe _____	Volume added _____ cu ft
Source of water: _____	Filter pack material: Manufacturer, product name & mesh size <u>Global Filter Pack #5</u> Volume added <u>2.5</u> cu ft
Bentonite seal, top _____ ft. MSL or <u>0.5</u> ft.	Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> Flush threaded PVC schedule 80 <input type="checkbox"/> Other <input type="checkbox"/>
Fine sand, top _____ ft. MSL or _____ ft.	Screen material: <u>PVC</u>
Filter pack, top _____ ft. MSL or <u>3.3</u> ft.	Screen type: Factory cut <input checked="" type="checkbox"/> Continuous slot <input type="checkbox"/> Other <input type="checkbox"/>
Screen joint, top _____ ft. MSL or <u>5</u> ft.	Manufacturer <u>Laibe</u>
Well bottom _____ ft. MSL or <u>15</u> ft.	Slot size: <u>0.010</u> in.
Filter pack, bottom _____ ft. MSL or <u>15</u> ft.	Slotted length: <u>10</u> ft.
Borehole, bottom _____ ft. MSL or <u>15.5</u> ft.	Backfill material (below filter pack): None <input checked="" type="checkbox"/> Other <input type="checkbox"/>
Borehole, diameter _____ in.	
O.D. well casing _____ in.	
I.D. well casing _____ in.	

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm

Montgomery Watson

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JOB NO. 4162.0204

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FLUSH MOUNT MONITORING WELL CONSTRUCTION SUMMARY

JOB NO. 4162.0204

Facility/Project Name <u>Camp Atterbury</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> S. ft. <input type="checkbox"/> E. <input type="checkbox"/> W.	Well Name <u>MW9</u>
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/>	Grid Origin Location Lat. _____ Long. _____ or St. Plane ft. N. ft. E.	Date Well Installed <u>27 June 96</u>
Distance Well Is From Waste/Source Boundary ft. _____	Section Location of Waste/Source <input type="checkbox"/> E. <input type="checkbox"/> W. Location of Well Relative to Waste/Source <input type="checkbox"/> Upgradient <input type="checkbox"/> Sidegradient <input type="checkbox"/> Downgradient <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) <u>MEV</u> (Geologist) <u>Ron / American</u> (Driller)

Watertight Cover elevation _____ ft. MSL	Bolt down water tight cover.	Inside Diameter: _____ (in.)	Length _____ (in.)
Well casing top elevation _____ ft. MSL			
Land surface elevation _____ ft. MSL			
Surface Seal, bottom _____ ft. MSL or _____ ft.			
USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/> Sieve analysis attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Drilling method used: <u>4 1/4"</u> Rotary <input type="checkbox"/> Hollow Stem Auger <input checked="" type="checkbox"/> Other <input type="checkbox"/> Drilling fluid used: Water <input type="checkbox"/> Air <input type="checkbox"/> Drilling Mud <input type="checkbox"/> None <input checked="" type="checkbox"/> Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Describe _____ Source of water: _____	Water tight well cap? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Lock? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Surficial Seal: Concrete <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Sand Drainage? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Material between well casing and protective pipe: Bentonite <input checked="" type="checkbox"/> Annular space seal <input type="checkbox"/> Other <input type="checkbox"/> Annular space seal: Granular Bentonite <input checked="" type="checkbox"/> Lbs/gal mud weight... Bentonite-sand slurry <input type="checkbox"/> Lbs/gal mud weight... Bentonite slurry <input type="checkbox"/> % Bentonite... Bentonite-cement grout <input type="checkbox"/> cu ft volume added for any of the above How installed: Tremie <input type="checkbox"/> Tremie pumped <input type="checkbox"/> Gravity <input checked="" type="checkbox"/> Bentonite seal: <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite granules <input type="checkbox"/> Bentonite pellets <input type="checkbox"/> Other <input type="checkbox"/> <u>Baroid Hole Plug</u> Fine sand material: Manufacturer, product name & mesh size Volume added _____ cu ft Filter pack material: Manufacturer, product name & mesh size <u>Global Filter Pack #5</u> Volume added <u>3.0</u> cu ft Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> Flush threaded PVC schedule 80 <input type="checkbox"/> Other <input type="checkbox"/> Screen material: <u>PVC</u> Screen type: Factory cut <input checked="" type="checkbox"/> Continuous slot <input type="checkbox"/> Other <input type="checkbox"/> Manufacturer <u>Laibe</u> Slot size: <u>0.010</u> in. Slotted length: <u>10.0</u> ft. Backfill material (below filter pack): None <input checked="" type="checkbox"/> Other <input type="checkbox"/>		
Bentonite seal, top _____ ft. MSL or <u>1.1</u> ft.			
Fine sand, top _____ ft. MSL or _____ ft.			
Filter pack, top _____ ft. MSL or <u>4.0</u> ft.			
Screen joint, top _____ ft. MSL or <u>5.0</u> ft.			
Well bottom _____ ft. MSL or <u>15.0</u> ft.			
Filter pack, bottom _____ ft. MSL or <u>15.0</u> ft.			
Borehole, bottom _____ ft. MSL or <u>15.0</u> ft.			
Borehole, diameter _____ in.			
O.D. well casing _____ in.			
I.D. well casing _____ in.			

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____

Firm _____

Montgomery Watson

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FLUSH MOUNT MONITORING WELL
CONSTRUCTION SUMMARY

JOB NO. 416210204

Facility/Project Name Camp Aterbury	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name MW10
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/>	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E. _____	Date Well Installed 28 June 96
Distance Well Is From Waste/Source Boundary ft. _____	Section Location of Waste/Source <input type="checkbox"/> E. <input type="checkbox"/> W. Location of Well Relative to Waste/Source <input type="checkbox"/> Upgradient <input type="checkbox"/> Sidegradient <input type="checkbox"/> Downgradient <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) MEU (Geologist) (Driller) Non/American

Water tight Cover elevation _____ ft. MSL	Bolt down water tight cover.
Well casing top elevation _____ ft. MSL	Inside Diameter: _____ (in.) Length _____ (in.)
Ground surface elevation _____ ft. MSL	Water tight well cap? Yes <input type="checkbox"/> No <input type="checkbox"/>
Surface Seal, bottom _____ ft. MSL or _____ ft.	Lock? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

USCS classification of soil near screen:

GP <input type="checkbox"/>	GM <input type="checkbox"/>	GC <input type="checkbox"/>	GW <input type="checkbox"/>	SW <input type="checkbox"/>	SP <input checked="" type="checkbox"/>
SM <input type="checkbox"/>	SC <input type="checkbox"/>	ML <input type="checkbox"/>	MH <input type="checkbox"/>	CL <input type="checkbox"/>	CH <input type="checkbox"/>

Bedrock ☐

Sieve analysis attached? ☐ Yes ☒ No

Drilling method used: Rotary ☐
4 1/4" Hollow Stem Auger ☒
Other ☐

Drilling fluid used: Water ☐ Air ☐
Drilling Mud ☐ None ☒

Drilling additives used? ☐ Yes ☒ No

Describe _____

Source of water: _____

ELEVATION	DEPTH
Bentonite seal, top _____ ft. MSL or 11.0 ft.	
Fine sand, top _____ ft. MSL or _____ ft.	
Filter pack, top _____ ft. MSL or 3.4 ft.	
Screen joint, top _____ ft. MSL or 10.0 ft.	
Well bottom _____ ft. MSL or 15.0 ft.	
Filter pack, bottom _____ ft. MSL or 15.0 ft.	
Borehole, bottom _____ ft. MSL or 15.0 ft.	
Borehole, diameter _____ in.	
O.D. well casing _____ in.	
I.D. well casing _____ in.	

Surficial Seal: Concrete ☒
Bentonite ☐

Sand Drainage? Yes ☐ No ☒

Material between well casing and protective pipe:
Bentonite ☒
Annular space seal ☐
Other ☐

Annular space seal: Granular Bentonite ☒
Lbs/gal mud weight... Bentonite-sand slurry ☐
Lbs/gal mud weight... Bentonite slurry ☐
% Bentonite... Bentonite-cement grout ☐
cu ft volume added for any of the above _____

How installed: Tremie ☐
Tremie pumped ☐
Gravity ☒

Bentonite seal: ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in.
Baroid Hole Plug
Bentonite granules ☐
Bentonite pellets ☐
Other ☐

Fine sand material: Manufacturer, product name & mesh size _____

Volume added _____ cu ft

Filter pack material: Manufacturer, product name & mesh size
Global Filter Pack #5

Volume added **2** cu ft

Well casing: Flush threaded PVC schedule 40 ☐
Flush threaded PVC schedule 80 ☐
Other ☐

Screen material: **PVC**

Screen type: Factory cut ☐
Continuous slot ☐
Other ☐

Manufacturer **Luibe**

Slot size: **0.010** in.

Slotted length: **10** ft.

Backfill material (below filter pack): None ☒
Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm



FLUSH MOUNT MONITORING WELL CONSTRUCTION SUMMARY

JOB NO. 416210204

Facility/Project Name <u>Camp Atterbury</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name <u>MW11</u>
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/>	Grid Origin Location Lat. _____ Long. _____ cr St. Plane _____ ft. N. _____ ft. E.	Date Well Installed <u>28 June 96</u>
Distance Well Is From Waste/Source Boundary ft. _____	Section Location of Waste/Source <input type="checkbox"/> E. <input type="checkbox"/> W. Location of Well Relative to Waste/Source <input type="checkbox"/> Upgradient <input type="checkbox"/> Sidegradient <input type="checkbox"/> Downgradient <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) (Geologist) <u>MEV</u> (Driller) <u>Ron / American</u>

Watertight Cover elevation _____ ft. MSL	Bolt down water tight cover.
Well casing top elevation _____ ft. MSL	Inside Diameter: _____ (in.) Length _____ (in.)
Land surface elevation _____ ft. MSL	Water tight well cap? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Seal, bottom _____ ft. MSL or _____ ft.	Lock? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

USCS classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
 SM ☐ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐
 Bedrock ☐

Sieve analysis attached? ☐ Yes ☒ No

Drilling method used:

Rotary ☐
 Hollow Stem Auger ☒
 Other ☐

Drilling fluid used:

Water ☐ Air ☐
 Drilling Mud ☐ None ☒

Drilling additives used?

☐ Yes ☒ No

Describe _____

Source of water: _____

	ELEVATION	DEPTH
Bentonite seal, top	ft. MSL or _____	1.0 ft.
Fine sand, top	ft. MSL or _____	
Filter pack, top	ft. MSL or _____	3.0 ft.
Screen joint, top	ft. MSL or _____	4.0 ft.
Well bottom	ft. MSL or _____	9.0 ft.
Filter pack, bottom	ft. MSL or _____	9.0 ft.
Borehole, bottom	ft. MSL or _____	9.0 ft.
Borehole, diameter	in.	
O.D. well casing	in.	
I.D. well casing	in.	

Surficial Seal: Concrete ☒
 Bentonite ☐
 Sand Drainage? Yes ☐ No ☒

Material between well casing and protective pipe:

Bentonite ☒
 Annular space seal ☐
 Other ☐
 Annular space seal: Granular Bentonite ☒
 Lbs/gal mud weight... Bentonite-sand slurry ☐
 Lbs/gal mud weight... Bentonite slurry ☐
 % Bentonite... Bentonite-cement grout ☐
 cu ft volume added for any of the above

How installed:

Tremie ☐
 Tremie pumped ☐
 Gravity ☒
 Bentonite seal: Bentonite granules ☐
☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐
Baroid Hole Plug Other ☐
 Fine sand material: Manufacturer, product name & mesh size

Volume added 1.5 cu ft
 Filter pack material: Manufacturer, product name & mesh size

Volume added _____ cu ft
 Well casing: Flush threaded PVC schedule 40 ☒
 Flush threaded PVC schedule 80 ☐
 Other ☐

Screen material: PVC
 Screen type: Factory cut ☐
 Continuous slot ☐
 Other ☐

Manufacturer Laibe
 Slot size: 0.010 in.
 Slotted length: 5 ft.
 Backfill material (below filter pack): None ☒
 Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____

Firm _____

Montgomery Watson

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FLUSH MOUNT MONITORING WELL
CONSTRUCTION SUMMARY

JOB NO. 4162.02084

Facility/Project Name <u>Camp Attentbury</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. ft. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name <u>MW12</u>
Type of Well Water Table Observation Well <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/>	Grid Origin Location Lat. _____ Long. _____ or St. Plane ft. N. _____ ft. E. _____	Date Well Installed <u>15 Aug 96</u>
Distance Well Is From Waste/Source Boundary <u>N/A</u> ft.	Section Location of Waste/Source <input type="checkbox"/> E. <input type="checkbox"/> W. Location of Well Relative to Waste/Source <input type="checkbox"/> Upgradient <input type="checkbox"/> Sidegradient <input type="checkbox"/> Downgradient <input checked="" type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) (Geologist) <u>M. Van Doren / mcd</u> (Driller) <u>American Env / Ron</u>

Water tight cover elevation _____ ft. MSL	Bolt down water tight cover.	Inside Diameter: _____ (in.)	Length _____ (in.)
Well casing top elevation _____ ft. MSL			
Ground surface elevation _____ ft. MSL			
Surface Seal, bottom _____ ft. MSL or _____ ft.			
USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/>	Water tight well cap? Yes <input type="checkbox"/> No <input type="checkbox"/> Lock? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Surficial Seal: Concrete <input type="checkbox"/> Bentonite <input type="checkbox"/>	Sand Drainage? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Sieve analysis attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Drilling method used: <u>4.25"</u> Rotary <input type="checkbox"/> Hollow Stem Auger <input checked="" type="checkbox"/> Other <input type="checkbox"/>			
Drilling fluid used: Water <input type="checkbox"/> Air <input type="checkbox"/> Drilling Mud <input type="checkbox"/> None <input type="checkbox"/>			
Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Describe _____			
Source of water: <u>hydrant on base</u>			
Bentonite seal, top _____ ft. MSL			
Fine sand, top _____ ft. MSL or _____ ft.			
Filter pack, top _____ ft. MSL or <u>2.0</u> ft.			
Screen joint, top _____ ft. MSL or <u>2.0</u> ft.			
Well bottom _____ ft. MSL or <u>12.0</u> ft.			
Filter pack, bottom _____ ft. MSL or <u>12.0</u> ft.			
Borehole, bottom _____ ft. MSL or <u>12.0</u> ft.			
Borehole, diameter _____ in.			
O.D. well casing _____ in.			
I.D. well casing _____ in.			

Volume added 2 cu ft
Filter pack material: Manufacturer, product name & mesh size
#5 Quartz Torpedo Sand
Volume added 3 cu ft
Well casing: Flush threaded PVC schedule 40 ☒
Flush threaded PVC schedule 80 ☐
Other ☐
Screen material: PVC
Screen type: Factory cut ☐
Continuous slot ☐
Other ☐
Manufacturer Johnson Laibe
Slot size: 0.010 in.
Slotted length: _____ ft.
Backfill material (below filter pack): None ☐
Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm

Montgomery Watson

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FLUSH MOUNT MONITORING WELL
CONSTRUCTION SUMMARY

JOB NO. 4162.02054

Facility/Project Name <u>Camp Atterbury</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. ft. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name <u>MW # 13</u>
Type of Well Water Table Observation Well <input type="checkbox"/> Piezometer <input type="checkbox"/>	Grid Origin Location Lat. _____ Long. _____ or St. Plane ft. N. _____ ft. E. _____	Date Well Installed <u>16 Aug 96</u>
Distance Well Is From Waste/Source Boundary ft. _____	Section Location of Waste/Source <input type="checkbox"/> E. <input type="checkbox"/> W. Location of Well Relative to Waste/Source <input type="checkbox"/> Upgradient <input type="checkbox"/> Sidegradient <input type="checkbox"/> Downgradient <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) (Geologist) <u>MEV</u> (Driller) <u>Ron / American</u>

Watertight Cover elevation _____ ft. MSL	Bolt down water tight cover.
Well casing top elevation _____ ft. MSL	Inside Diameter: _____ (in.) Length _____ (in.)
Land surface elevation _____ ft. MSL	Water tight well cap? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Seal, bottom _____ ft. MSL or <u>2.0</u> ft.	Lock? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

USCS classification of soil near screen:	
GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input type="checkbox"/> SW <input type="checkbox"/> SP <input type="checkbox"/>	
SM <input checked="" type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/>	
Bedrock <input type="checkbox"/>	
Sieve analysis attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Drilling method used:	Rotary <input type="checkbox"/> Hollow Stem Auger <input checked="" type="checkbox"/> Other <input type="checkbox"/>
Drilling fluid used: Water <input type="checkbox"/> Air <input type="checkbox"/> Drilling Mud <input type="checkbox"/> None <input checked="" type="checkbox"/>	
Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Describe _____	
Source of water: _____	

Bentonite seal, top _____ ft. MSL or <u>17.0</u> ft.	Surficial Seal: Concrete <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/>
Fine sand, top _____ ft. MSL or _____ ft.	Sand Drainage? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Filter pack, top _____ ft. MSL or <u>20.0</u> ft.	Material between well casing and protective pipe: Bentonite <input checked="" type="checkbox"/> Annular space seal <input type="checkbox"/> Other <input type="checkbox"/>
Screen joint, top _____ ft. MSL or <u>22.3</u> ft.	Annular space seal: Granular Bentonite <input type="checkbox"/> Bentonite-sand slurry <input type="checkbox"/> Bentonite slurry <input checked="" type="checkbox"/> Bentonite-cement grout <input type="checkbox"/>
Well bottom _____ ft. MSL or <u>32.5</u> ft.	Lbs/gal mud weight... _____ Lbs/gal mud weight... _____ % Bentonite... _____ cu ft volume added for any of the above _____
Filter pack, bottom _____ ft. MSL or <u>32.5</u> ft.	How installed: Tremie <input type="checkbox"/> Tremie pumped <input checked="" type="checkbox"/> Gravity <input type="checkbox"/>
Borehole, bottom _____ ft. MSL or <u>32.5</u> ft.	Bentonite seal: <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. <input type="checkbox"/> Other <input type="checkbox"/>
Borehole, diameter _____ in.	<u>NSF Pure Gold, medium</u> Fine sand material: Manufacturer, product name & mesh size
O.D. well casing _____ in.	Volume added _____ cu ft
I.D. well casing _____ in.	Filter pack material: Manufacturer, product name & mesh size <u>#5 Quante Torpedo Sand</u> Volume added <u>4.0</u> cu ft <u>8 bags</u>
	Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> Flush threaded PVC schedule 80 <input type="checkbox"/> Other <input type="checkbox"/>
	Screen material: <u>PVC</u>
	Screen type: Factory cut <input checked="" type="checkbox"/> Continuous slot <input type="checkbox"/> Other <input type="checkbox"/>
	Manufacturer <u>Johnson Laibe</u>
	Slot size: <u>0.1010</u> in.
	Slotted length: <u>10.1</u> ft.
	Backfill material (below filter pack): None <input checked="" type="checkbox"/> Other <input type="checkbox"/>

35 gal H₂O

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____	Firm Montgomery Watson	[F:\Forms\M-MWFLSH.xls]
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FLUSH MOUNT MONITORING WELL
CONSTRUCTION SUMMARY

JOB NO. 4162.02084

City/Project Name <u>Camp Altherbury</u>	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. ft. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name <u>MW14</u>
Use of Well Water Table Observation Well <input checked="" type="checkbox"/> Piezometer <input type="checkbox"/>	Grid Origin Location Lat. _____ Long. _____ or St. Plane ft. N. _____ ft. E. _____	Date Well Installed <u>16 Aug 96</u>
Distance Well Is From Waste/Source Boundary ft. _____	Section Location of Waste/Source <input type="checkbox"/> E. <input type="checkbox"/> W. Location of Well Relative to Waste/Source <input type="checkbox"/> Upgradient <input type="checkbox"/> Sidegradient <input type="checkbox"/> Downgradient <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) <u>MEU / M.W.</u> (Geologist) <u>Ron / American</u> (Driller)

Watertight Cover elevation _____ ft. MSL

Well casing top elevation _____ ft. MSL

Land surface elevation _____ ft. MSL

Surface Seal, bottom _____ ft. MSL or _____ ft.

USCS classification of soil near screen:

GP <input type="checkbox"/>	GM <input type="checkbox"/>	GC <input type="checkbox"/>	GW <input type="checkbox"/>	SW <input type="checkbox"/>	SP <input checked="" type="checkbox"/>
SM <input type="checkbox"/>	SC <input type="checkbox"/>	ML <input type="checkbox"/>	MH <input type="checkbox"/>	CL <input type="checkbox"/>	CH <input type="checkbox"/>
Bedrock <input type="checkbox"/>					

Sieve analysis attached? ☐ Yes ☒ No

Drilling method used:

Rotary <input type="checkbox"/>
Hollow Stem Auger <input checked="" type="checkbox"/>
Other <input type="checkbox"/>

Drilling fluid used:

Water <input type="checkbox"/>	Air <input type="checkbox"/>
Drilling Mud <input type="checkbox"/>	None <input checked="" type="checkbox"/>

Drilling additives used?

☐ Yes ☒ No

Describe _____

Source of water: _____

Bentonite seal, top _____ ft. MSL or 15.7 ft.

Fine sand, top _____ ft. MSL or _____ ft.

Filter pack, top _____ ft. MSL or 17.3 ft.Screen joint, top _____ ft. MSL or 19.3 ft.Well bottom _____ ft. MSL or 29.3 ft.Filter pack, bottom _____ ft. MSL or 29.3 ft.Borehole, bottom _____ ft. MSL or 30 ft.

Borehole, diameter _____ in.

O.D. well casing _____ in.

I.D. well casing _____ in.

Bolt down water tight cover.

Inside Diameter: _____ (in.) Length _____ (in.)

Water tight well cap?

Yes ☒ No ☐

Lock?

Yes ☐ No ☒

Surficial Seal:

Concrete ☒
Bentonite ☐

Sand Drainage?

Yes ☐ No ☒

Material between well casing and protective pipe:

Bentonite ☒Annular space seal ☐Other ☐

Annular space seal:

Granular Bentonite ☐Lbs/gal mud weight... Bentonite-sand slurry ☐Lbs/gal mud weight... Bentonite slurry ☒% Bentonite... Bentonite-cement grout ☐

cu ft volume added for any of the above

How installed:

Tremie ☐Tremie pumped ☒Gravity ☐Bentonite granules ☐Bentonite pellets ☒Other ☐

Bentonite seal:

☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in.

MSF Pure Gold medium

Fine sand material: Manufacturer, product name & mesh size

Volume added _____ cu ft

Filter pack material: Manufacturer, product name & mesh size

#5 Quartz Torpedo Sand

Volume added 12.5 cu ft 5 bagsWell casing: ☒ Flush threaded PVC schedule 40☐ Flush threaded PVC schedule 80Other ☐

Screen material:

PVC

Screen type:

Factory cut ☒Continuous slot ☐Other ☐Manufacturer Johnson Laibe

Slot size:

0.010 in.

Slotted length:

10.1 ft.

Backfill material (below filter pack):

None ☐Other ☐

Note: Could only get 1 bag filter pack material down hole, due to ciths formation

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____

Firm _____

Montgomery Watson

From 29-26

(F:\Forms\M-MWFLSH.xls)

Then convert filter pack

Appendix D

D

WELL DEVELOPMENT DATA SHEETS

WATSON



Project Name Camp Atherbury
 Location Edinburgh IN
 Developed By MEV

Well No. NW16
 Project No. 4162.0204
 Checked By _____

Can this well be purged dry?

☐ Yes ☒ No

Well development method

☐ surged with bailer and bailed
☐ surged with bailer and pumped
☐ surged with block and bailed
☐ surged with block and pumped
☐ surged with block, bailed and pumped
☐ compressed air
☐ bailed only
☐ pumped only
☐ pumped slowly
 Other artesian ☒

Time spent developing well

45 min.

Total well depth (TOC)

20.0 ft.

(From well construction summary)

Measured well depth (Before)

 ft.

Measured well depth (After)

20.0 ft.

Inside diameter of well

2.00 in.

6. Volume of water in filter pack and well casing

 gal.

Volume of water removed from well

1/2 gal.

Relative recovery rate

 ft. per. min.

9. Volume of water added (if any)

 gal.

Source of water added

 10 Depth to Water
 (from top of well casing)

Date:

Time:

Before Development

After Development

a. 1/2 ft.
1/2 ft.
b. 6/29/96
mm dd yy
6/29/96
mm dd yy
c. 11:45 ☒ a.m. ☐ p.m.
12:31 ☐ a.m. ☒ p.m.

 11 Sediment in well
 bottom:

 inches

 inches

12 Water Observations:

 Clear ☐
 Turbid ☒
 (Describe) brown

 Clear ☒
 Turbid ☐
 (Describe) v. lt. brn

Color

Odor

Turbidity

HNU

high
low
Filter Pack Vol. (gallons) $0.057(R^2 - r^2) L_s$ = Well casing Vol. (gallons) $0.16r^2 L$ = Saturated length of sand pack (ft.) (Ls) = Length of water column (ft.) (L) =

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility:

 13 Total suspended solids
 (500 ml Unfiltered)

mg/l

mg/l

 14. COD
 (250 ml Unfiltered Sulfuric)

mg/l

mg/l

(BEFORE)

(AFTER)

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb.	Comment
1150		7.96	300	19.1		brn	-	hi	
1155		8.01	292	12.5		brn	-	hi	
1200		8.10	280	15.4		brn	-	hi	
1205		8.01	270	13.9		lt. brn	-	hi	
1210		7.95	270	16.9		lt. brn	-	med	
1215		7.99	269	14.9		lt. brn	-	med	
1220		8.02	262	14.8		lt. brn	-	med	
1225		7.89	262	17.9		v. lt. brn	-	low	



Project Name Camp Herbury
 Location Edinburgh DN
 Developed By MEV

Well No. MW 7
 Project No. 4162.0204
 Checked By _____

<p>1. Can this well be purged dry? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>2. Well development method</p> <p>surged with bailer and bailed <input type="checkbox"/></p> <p>surged with bailer and pumped <input checked="" type="checkbox"/></p> <p>surged with block and bailed <input type="checkbox"/></p> <p>surged with block and pumped <input type="checkbox"/></p> <p>surged with block, bailed and pumped <input type="checkbox"/></p> <p>compressed air <input type="checkbox"/></p> <p>bailed only <input type="checkbox"/></p> <p>pumped only <input type="checkbox"/></p> <p>pumped slowly <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>3. Time spent developing well <u>45</u> min.</p> <p>4. Total well depth (TOC) <u>15.0</u> ft. (From well construction summary)</p> <p>Measured well depth (Before) _____ ft.</p> <p>Measured well depth (After) <u>2.3</u> ft.</p> <p>5. Inside diameter of well <u>2.00</u> in.</p> <p>6. Volume of water in filter pack and well casing _____ gal.</p> <p>7. Volume of water removed from well <u>24.6</u> gal.</p> <p>Relative recovery rate _____ ft. per. _____ min.</p> <p>8. Volume of water added (if any) _____ gal.</p> <p>9. Source of water added _____</p>	<p>10 Depth to Water (from top of well casing)</p> <p>Date: _____</p> <p>Time: _____</p> <p>11 Sediment in well bottom: _____ inches</p> <p>12 Water Observations:</p> <p>Clear <input type="checkbox"/></p> <p>Turbid <input checked="" type="checkbox"/> (Describe) <u>Med. brown</u></p> <p>Color <u>Med. brown</u></p> <p>Odor <u>Turbid</u></p> <p>Turbidity <u>low</u></p> <p>HNu _____</p>	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">Before Development</th> <th style="width:50%;">After Development</th> </tr> </thead> <tbody> <tr> <td>a. <u>2.32</u> ft.</td> <td><u>2.32</u> ft.</td> </tr> <tr> <td>b. <u>6129196</u> mm dd yy</td> <td><u>6129196</u> mm dd yy</td> </tr> <tr> <td>c. <u>10:34</u> <input checked="" type="checkbox"/> a.m. <input type="checkbox"/> p.m.</td> <td><u>11:19</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.</td> </tr> </tbody> </table> <p>Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = _____</p> <p>Well casing Vol. (gallons) $0.16r^2 l$ = _____</p> <p>Saturated length of sand pack (ft.) (ls) _____</p> <p>Length of water column (ft.) (l) _____</p> <p>R = Radius of borehole (in.) r = Well radius (in.)</p> <p>Collect groundwater sample if drilling fluids were used and well is at solid waste facility:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:33%;">13 Total suspended solids (500 ml Unfiltered)</td> <td style="width:33%;">_____ mg/l</td> <td style="width:33%;">_____ mg/l</td> </tr> <tr> <td>14. COD (250 ml Unfiltered Sulfuric)</td> <td>_____ mg/l (BEFORE)</td> <td>_____ mg/l (AFTER)</td> </tr> </table>	Before Development	After Development	a. <u>2.32</u> ft.	<u>2.32</u> ft.	b. <u>6129196</u> mm dd yy	<u>6129196</u> mm dd yy	c. <u>10:34</u> <input checked="" type="checkbox"/> a.m. <input type="checkbox"/> p.m.	<u>11:19</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.	13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l	14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)
Before Development	After Development															
a. <u>2.32</u> ft.	<u>2.32</u> ft.															
b. <u>6129196</u> mm dd yy	<u>6129196</u> mm dd yy															
c. <u>10:34</u> <input checked="" type="checkbox"/> a.m. <input type="checkbox"/> p.m.	<u>11:19</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.															
13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l														
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)														

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb.	Comment
1043	2.08	7.41	465	14.8		Med. brown	—	hi	
1048		7.61	450	14.1		Med. brown	—	hi	
1053		7.66	452	15.7		lt. brn	—	hi	
1058		7.72	452	15.1		lt. brn	—	Med	
1103		7.87	445	18.7		lt. brn	—	Med	
1108		7.70	445	17.9		lt. brn	—	low	
1113	✓	7.80	442	16.5		lt. brn	—	low	

Well No. MWB
Project No. 4162.0204
Checked By _____

1 Can this well be purged dry?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
2 Well development method			
surged with bailer and bailed	<input type="checkbox"/>		
surged with bailer and pumped	<input type="checkbox"/>		
surged with block and bailed	<input type="checkbox"/>		
surged with block and pumped	<input type="checkbox"/>		
surged with block, bailed and pumped	<input type="checkbox"/>		
compressed air	<input type="checkbox"/>		
bailed only	<input type="checkbox"/>		
pumped only	<input type="checkbox"/>		
pumped slowly	<input type="checkbox"/>		
Other <u>artesian</u>	<input checked="" type="checkbox"/>		
Time spent developing well	<u>10</u> min.		
Total well depth (TOC)	<u>30.0</u> ft.		
(From well construction summary)			
Measured well depth (Before)	<u>N/A</u> ft.		
Measured well depth (After)	<u>N/A</u> ft.		
Inside diameter of well	<u>2.00</u> in.		
6. Volume of water in filter pack and well casing	<u> </u> gal.		
Volume of water removed from well	<u>N/A</u> gal.		
Relative recovery rate	<u> </u> ft. per. <u> </u> min.		
8. Volume of water added (if any)	<u> </u> gal.		
Source of water added	<u> </u>		
10 Depth to Water (from top of well casing)			
Date:			
Time:			
11 Sediment in well bottom:			
12 Water Observations:			
Color	<input checked="" type="checkbox"/>		
Turbid (Describe)	<input type="checkbox"/>		
Odor	<u>clear</u>		
Turbidity	<u>low</u>		
HNu	<u> </u>		
Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$	= <u> </u>		
Well casing Vol. (gallons) $0.16r^2 l$	= <u> </u>		
Saturated length of sand pack (ft.) (ls)	<u> </u>		
Length of water column (ft.) (l)	<u> </u>		
R = Radius of borehole (in.) r = Well radius (in.)			
Collect groundwater sample if drilling fluids were used and well is at solid waste facility:			
13 Total suspended solids (500 ml Unfiltered)	<u> </u> mg/l		
14. COD (250 ml Unfiltered Sulfuric)	<u> </u> mg/l		
	(BEFORE)		
	(AFTER)		

[illegible]



Project Name Camp Rutherford
 Location Edinburgh IN
 Developed By MEV

Well No. 11104
 Project No. 4162.0204
 Checked By _____

<p>1. Can this well be purged dry? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>2. Well development method</p> <p>surged with bailer and bailed <input type="checkbox"/></p> <p>surged with bailer and pumped <input checked="" type="checkbox"/></p> <p>surged with block and bailed <input type="checkbox"/></p> <p>surged with block and pumped <input type="checkbox"/></p> <p>surged with block, bailed and pumped <input type="checkbox"/></p> <p>compressed air <input type="checkbox"/></p> <p>bailed only <input type="checkbox"/></p> <p>pumped-only <input type="checkbox"/></p> <p>pumped slowly <input type="checkbox"/></p> <p>Other _____ <input type="checkbox"/></p> <p>3. Time spent developing well _____ <u>30</u> min.</p> <p>4. Total well depth (TOC) _____ <u>15.0</u> ft. (From well construction summary)</p> <p>Measured well depth (Before) _____ <u>8.6</u> ft.</p> <p>Measured well depth (After) _____ <u>15.0</u> ft.</p> <p>5. Inside diameter of well _____ <u>2.00</u> in.</p> <p>6. Volume of water in filter pack and well casing _____ gal.</p> <p>7. Volume of water removed from well _____ <u>3.8</u> gal.</p> <p>Relative recovery rate _____ ft. per. _____ min.</p> <p>8. Volume of water added (if any) _____ gal.</p> <p>9. Source of water added _____</p>	<p>10 Depth to Water (from top of well casing)</p> <p>Date: _____</p> <p>Time: _____</p> <p>11 Sediment in well bottom: _____ inches</p> <p>12 Water Observations:</p> <p>Clear <input type="checkbox"/></p> <p>Turbid <input checked="" type="checkbox"/> (Describe) <u>lt. brn</u></p> <p>Color _____</p> <p>Odor _____</p> <p>Turbidity <u>high</u></p> <p>HNu _____</p>	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">Before Development</th> <th style="width:50%;">After Development</th> </tr> </thead> <tbody> <tr> <td>a. _____ <u>4.00</u> ft.</td> <td>_____ <u>4.00</u> ft.</td> </tr> <tr> <td>b. <u>6/29/96</u> mm dd yy</td> <td><u>6/29/96</u> mm dd yy</td> </tr> <tr> <td>c. <u>18:15</u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.</td> <td><u>18:45</u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.</td> </tr> <tr> <td>Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = _____</td> <td></td> </tr> <tr> <td>Well casing Vol. (gallons) $0.16r^2 l$ = _____</td> <td></td> </tr> <tr> <td>Saturated length of sand pack (ft.) (ls) _____</td> <td></td> </tr> <tr> <td>Length of water column (ft.) (l) _____</td> <td></td> </tr> <tr> <td colspan="2">R = Radius of borehole (in.) r = Well radius (in.)</td> </tr> <tr> <td colspan="2">Collect groundwater sample if drilling fluids were used and well is at solid waste facility.</td> </tr> <tr> <td>13 Total suspended solids (500 ml Unfiltered) _____ mg/l</td> <td>_____ mg/l</td> </tr> <tr> <td>14. COD (250 ml Unfiltered Sulfuric) _____ mg/l (BEFORE)</td> <td>_____ mg/l (AFTER)</td> </tr> </tbody> </table>	Before Development	After Development	a. _____ <u>4.00</u> ft.	_____ <u>4.00</u> ft.	b. <u>6/29/96</u> mm dd yy	<u>6/29/96</u> mm dd yy	c. <u>18:15</u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.	<u>18:45</u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.	Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = _____		Well casing Vol. (gallons) $0.16r^2 l$ = _____		Saturated length of sand pack (ft.) (ls) _____		Length of water column (ft.) (l) _____		R = Radius of borehole (in.) r = Well radius (in.)		Collect groundwater sample if drilling fluids were used and well is at solid waste facility.		13 Total suspended solids (500 ml Unfiltered) _____ mg/l	_____ mg/l	14. COD (250 ml Unfiltered Sulfuric) _____ mg/l (BEFORE)	_____ mg/l (AFTER)
Before Development	After Development																									
a. _____ <u>4.00</u> ft.	_____ <u>4.00</u> ft.																									
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Collect groundwater sample if drilling fluids were used and well is at solid waste facility.																										
13 Total suspended solids (500 ml Unfiltered) _____ mg/l	_____ mg/l																									
14. COD (250 ml Unfiltered Sulfuric) _____ mg/l (BEFORE)	_____ mg/l (AFTER)																									

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb.	Comment
1820	0.76	7.62	495	16.7		lt brn.	—	hi	
1825		7.52	480	16.6		lt brn.	—	hi	
1830		7.43	480	16.4		lt brn	—	hi	
1835		7.38	480	16.8		lt brn	—	hi	
1840	✓	7.41	475	16.8		lt brn	—	hi	

Well No. MW10
Project No. 462.0204
Checked By _____

Can this well be purged dry? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		10 Depth to Water (from top of well casing)		Before Development	After Development
2 Well development method		Date:		a. <u>4.12</u> ft	<u>4.12</u> ft
surged with bailer and bailed <input type="checkbox"/>		Time:		b. <u>6/28/96</u> mm dd yy	<u>6/28/96</u> mm dd yy
surged with bailer and pumped <input checked="" type="checkbox"/>				<input type="checkbox"/> a.m.	<input type="checkbox"/> a.m.
surged with block and bailed <input type="checkbox"/>				c. <u>17:08</u> <input type="checkbox"/> p.m.	<u>17:20</u> <input type="checkbox"/> p.m.
surged with block and pumped <input type="checkbox"/>		11 Sediment in well bottom:		_____ inches	_____ inches
surged with block, bailed and pumped <input type="checkbox"/>		12 Water Observations:		Clear <input type="checkbox"/>	Clear <input type="checkbox"/>
compressed air <input type="checkbox"/>		Color		Turbid <input checked="" type="checkbox"/>	Turbid <input checked="" type="checkbox"/>
bailed only <input type="checkbox"/>		Odor		(Describe) <u>lt. brown</u>	(Describe) <u>lt. brown</u>
pumped only <input type="checkbox"/>		Turbidity		<u>high</u>	<u>high</u>
pumped slowly <input type="checkbox"/>		HNu			
Other _____ <input type="checkbox"/>		Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$		= _____	
Time spent developing well <u>12</u> min.		Well casing Vol. (gallons) $0.16r^2 l$		= _____	
Total well depth (TOC) <u>15.0</u> ft.		Saturated length of sand pack (ft.) (ls)		_____	
(From well construction summary)		Length of water column (ft.) (l)		_____	
Measured well depth (Before) <u>14.7</u> ft.		R = Radius of borehole (in.) r = Well radius (in.)			
Measured well depth (After) <u>15.0</u> ft.		Collect groundwater sample if drilling fluids were used and well is at solid waste facility:			
Inside diameter of well <u>2.00</u> in.		13 Total suspended solids (500 ml Unfiltered)		_____ mg/l	_____ mg/l
6. Volume of water in filter pack and well casing _____ gal.		14. COD (250 ml Unfiltered Sulfuric)		_____ mg/l	_____ mg/l
Volume of water removed from well <u>8.7</u> gal.				(BEFORE)	(AFTER)
Relative recovery rate _____ ft. per. _____ min.					
8. Volume of water added (if any) _____ gal.					
Source of water added _____					

[illegible]



Project Name Camp Htterbury
 Location Edinburgh TN
 Developed By MEV

Well No. MW11
 Project No. 4102.0204
 Checked By _____

<p>1. Can this well be purged dry? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>2. Well development method</p> <p>surged with bailer and bailed <input type="checkbox"/></p> <p>surged with bailer and pumped <input checked="" type="checkbox"/></p> <p>surged with block and bailed <input type="checkbox"/></p> <p>surged with block and pumped <input type="checkbox"/></p> <p>surged with block, bailed and pumped <input type="checkbox"/></p> <p>compressed air <input type="checkbox"/></p> <p>bailed only <input type="checkbox"/></p> <p>pumped only <input type="checkbox"/></p> <p>pumped slowly <input type="checkbox"/></p> <p>Other <input type="checkbox"/></p> <p>3. Time spent developing well <u>34</u> min.</p> <p>4. Total well depth (TOC) <u>9.0</u> ft. (From well construction summary)</p> <p>Measured well depth (Before) _____ ft.</p> <p>Measured well depth (After) <u>9.0</u> ft.</p> <p>5. Inside diameter of well <u>2.00</u> in.</p> <p>6. Volume of water in filter pack and well casing _____ gal.</p> <p>7. Volume of water removed from well <u>89</u> gal.</p> <p>Relative recovery rate _____ ft. per. _____ min.</p> <p>8. Volume of water added (if any) _____ gal.</p> <p>9. Source of water added _____</p>	<p>10 Depth to Water (from top of well casing)</p> <p>Date: _____</p> <p>Time: _____</p> <p>11 Sediment in well bottom: _____ inches</p> <p>12 Water Observations:</p> <p>Clear <input type="checkbox"/></p> <p>Turbid <input checked="" type="checkbox"/> (Describe) <u>lt brn</u></p> <p>Color <u>lt brn</u></p> <p>Odor <u>hi</u></p> <p>Turbidity <u>low</u></p> <p>HNu _____</p>	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">Before Development</th> <th style="width:50%;">After Development</th> </tr> </thead> <tbody> <tr> <td>a. <u>3.90</u> ft.</td> <td><u>3.90</u> ft.</td> </tr> <tr> <td>b. <u>6/29/96</u> mm dd yy</td> <td><u>6/29/96</u> mm dd yy</td> </tr> <tr> <td>c. <u>17:20</u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.</td> <td><u>17:54</u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.</td> </tr> <tr> <td>Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = _____</td> <td></td> </tr> <tr> <td>Well casing Vol. (gallons) $0.16r^2 l$ = _____</td> <td></td> </tr> <tr> <td>Saturated length of sand pack (ft.) (ls) _____</td> <td></td> </tr> <tr> <td>Length of water column (ft.) (l) _____</td> <td></td> </tr> <tr> <td colspan="2">R = Radius of borehole (in.) r = Well radius (in.)</td> </tr> <tr> <td colspan="2">Collect groundwater sample if drilling fluids were used and well is at solid waste facility.</td> </tr> <tr> <td>13 Total suspended solids (500 ml Unfiltered) _____ mg/l</td> <td>_____ mg/l</td> </tr> <tr> <td>14. COD (250 ml Unfiltered Sulfuric) _____ mg/l (BEFORE)</td> <td>_____ mg/l (AFTER)</td> </tr> </tbody> </table>	Before Development	After Development	a. <u>3.90</u> ft.	<u>3.90</u> ft.	b. <u>6/29/96</u> mm dd yy	<u>6/29/96</u> mm dd yy	c. <u>17:20</u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.	<u>17:54</u> <input type="checkbox"/> a.m. <input type="checkbox"/> p.m.	Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = _____		Well casing Vol. (gallons) $0.16r^2 l$ = _____		Saturated length of sand pack (ft.) (ls) _____		Length of water column (ft.) (l) _____		R = Radius of borehole (in.) r = Well radius (in.)		Collect groundwater sample if drilling fluids were used and well is at solid waste facility.		13 Total suspended solids (500 ml Unfiltered) _____ mg/l	_____ mg/l	14. COD (250 ml Unfiltered Sulfuric) _____ mg/l (BEFORE)	_____ mg/l (AFTER)
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Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb.	Comment
1730	1.77	7.83	600	18.2		lt brn	-	hi	
1735	↓	7.64	600	15.6		lt brn	-	hi	
1740		7.53	600	15.5		lt brn	-	med	
1745		7.50	600	15.1		V. lt brn	-	lo	
1750		7.44	600	15.4		V. lt brn	-	lo	

Well No. MW12
Project No. 4162.0204
Checked By _____

[illegible]

Well purged dry at ~ 6 well volumes:



Project Name Camp A Herbury
 Location Edinburgh DN
 Developed By MEV

Well No. MW13
 Project No. 4162.0204
 Checked By _____

<p>1. Can this well be purged dry? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>2. Well development method</p> <p>surged with bailer and bailed <input type="checkbox"/></p> <p>surged with bailer and pumped <input checked="" type="checkbox"/></p> <p>surged with block and bailed <input type="checkbox"/></p> <p>surged with block and pumped <input type="checkbox"/></p> <p>surged with block, bailed and pumped <input type="checkbox"/></p> <p>compressed air <input type="checkbox"/></p> <p>bailed only <input type="checkbox"/></p> <p>pumped only <input type="checkbox"/></p> <p>pumped slowly <input type="checkbox"/></p> <p>Other _____ <input type="checkbox"/></p> <p>3. Time spent developing well _____ <u>52</u> min.</p> <p>4. Total well depth (TOC) _____ <u>32.5</u> ft. (From well construction summary)</p> <p>Measured well depth (Before) _____ ft.</p> <p>Measured well depth (After) _____ <u>32.5</u> ft.</p> <p>5. Inside diameter of well _____ <u>2.00</u> in.</p> <p>6. Volume of water in filter pack and well casing _____ gal.</p> <p>7. Volume of water removed from well _____ <u>18.1</u> gal.</p> <p>Relative recovery rate _____ ft. per. _____ min.</p> <p>8. Volume of water added (if any) _____ gal.</p> <p>9. Source of water added _____</p>	<p>10 Depth to Water (from top of well casing)</p> <p>Date: _____</p> <p>Time: _____</p> <p>11 Sediment in well bottom: _____ inches</p> <p>12 Water Observations:</p> <p>Clear <input type="checkbox"/></p> <p>Turbid <input checked="" type="checkbox"/> (Describe) <u>brn</u></p> <p>Color _____</p> <p>Odor _____</p> <p>Turbidity <u>hi</u></p> <p>HNu _____</p>	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">Before Development</th> <th style="width:50%;">After Development</th> </tr> </thead> <tbody> <tr> <td>a. _____ <u>4.27</u> ft.</td> <td>_____ <u>0.00</u> ft.</td> </tr> <tr> <td>b. <u>8/20/96</u> mm dd yy</td> <td><u>8/20/96</u> mm dd yy</td> </tr> <tr> <td><input type="checkbox"/> a.m.</td> <td><input type="checkbox"/> a.m.</td> </tr> <tr> <td>c. <u>14:38</u> <input type="checkbox"/> p.m.</td> <td><u>15:30</u> <input type="checkbox"/> p.m.</td> </tr> </tbody> </table> <p>Filter Pack Vol. (gallons) $0.057(R^2 - r^2)ls$ = _____</p> <p>Well casing Vol. (gallons) $0.16r^2 l$ = _____</p> <p>Saturated length of sand pack (ft.) (ls) _____</p> <p>Length of water column (ft.) (l) _____</p> <p>R = Radius of borehole (in.) r = Well radius (in.)</p> <p>Collect groundwater sample if drilling fluids were used and well is at solid waste facility:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">13 Total suspended solids (500 ml Unfiltered)</td> <td style="width:25%;">_____ mg/l</td> <td style="width:25%;">_____ mg/l</td> </tr> <tr> <td>14. COD (250 ml Unfiltered Sulfuric)</td> <td>_____ mg/l (BEFORE)</td> <td>_____ mg/l (AFTER)</td> </tr> </table>	Before Development	After Development	a. _____ <u>4.27</u> ft.	_____ <u>0.00</u> ft.	b. <u>8/20/96</u> mm dd yy	<u>8/20/96</u> mm dd yy	<input type="checkbox"/> a.m.	<input type="checkbox"/> a.m.	c. <u>14:38</u> <input type="checkbox"/> p.m.	<u>15:30</u> <input type="checkbox"/> p.m.	13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l	14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)
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13 Total suspended solids (500 ml Unfiltered)	_____ mg/l	_____ mg/l																
14. COD (250 ml Unfiltered Sulfuric)	_____ mg/l (BEFORE)	_____ mg/l (AFTER)																

Time	Gallons Purged	pH	Spec. Cond.	T deg. C	Spec. Cond. at 25 deg. C	Color	Odor	Turb.	Comment
	<u>4.54</u>	<u>7.07</u>	<u>650</u>	<u>17.9</u>		<u>brn</u>	<u>-</u>	<u>hi</u>	
	<u>↓</u>	<u>7.00</u>	<u>700</u>	<u>17.0</u>		<u>brn</u>	<u>-</u>	<u>hi</u>	
	<u>↓</u>	<u>7.54</u>	<u>7610</u>	<u>15.0</u>		<u>brn</u>	<u>-</u>	<u>hi</u>	
	<u>✓</u>	<u>7.71</u>	<u>600</u>	<u>17.8</u>		<u>brn</u>	<u>-</u>	<u>hi</u>	

Well No. NAW14
Project No. 4162.0204
Checked By _____

☐ Yes ☒ No

10 Depth to Water
(from top of
well casing)

After Development

☒☐☐☐☐

13 min.

30.0 ft.

 $\cdot \quad \cdot \quad ft$

30.0 ft

2.00 in

_____ gal.

6.7 gal.

ft. per. _____ min. _____

gal.

. inches

Clear ☐
Turbid ☒
(Describe) _____

business

1750

high

227-708

Well casing Vol. (gallons) $0.16r^2 l$ =

Length of water column (ft.) (1)

R = Radius of borehole (in.) r = Well radius (in.)

Collect groundwater sample if drilling fluids were used and well is at solid waste facility.

mg/l	mg/l
------	------

мг/л	мг/л
------	------

(BEFORE)

WATER

\Forms\M-DEVEL.xls]

Appendix E

E

GROUNDWATER SAMPLING DATA SHEETS

GROUNDWATER SAMPLING DATA SHEET

Project
Project No.
Field Personnel:

Attentbury
4162.0205
MEU, ~~PAW~~ CO

Date 8/20/96
Sample No. _____

Well No. MW 1

Time

1700

Initial Water Level
• Depth of Well
• Length of Water Column
• Diameter of Well
• One Well Volume
• Evacuation Method

50.64'
59.57'
8.93'
2.00"
1.46 gal
Whale Pump

1705

Began Evacuation

1740

Number of Volumes Removed

5

Began Sampling

1830

Completed Sampling
• Sampling Method

Whale Pump

1740

Field Analysis

• Temperature
• Conductivity
• pH
• Turbidity
• Color
• Odor
• Other

1	2	3	4	5	6
15.3	14.8	15.5	14.2	14.0	
390	390	400	400	400	
7.47	7.53	7.59	7.62	7.72	
turbid	turbid	turbid	turbid	turbid	
brown	brown	brown	brown	brown	
-	-	-	-	-	-
-	-	-	-	-	-

Well Casing Volumes
(gal/ft)

1.25" = 0.077
1.5" = 0.10
2" = 0.164
2.5" = 0.24
3" = 0.37
3.5" = 0.50
4" = 0.65
6" = 1.46

Samples Obtained / Remarks:

GROUNDWATER SAMPLING DATA SHEET

Project Camp Atterbury Date 6/29/96 Well No. MW6
 Project No. 4162.0204 Sample No. _____
 Field Personnel: CMB, MEV

Time _____

Initial Water Level _____

* Depth of Well _____

* Length of Water Column _____

* Diameter of Well _____

* One Well Volume _____

* Evacuation Method _____

Artesian

20'

n/a

2.00"

n/a

Whale pump

Began Evacuation _____

Number of Volumes Removed _____

8

Began Sampling _____

Completed Sampling _____

* Sampling Method _____

Whale pump

Field Analysis

* Temperature

* Conductivity

* pH

* Turbidity

* Color

* Odor

* Other

1 2 3 4 5 6 7 8

19.1 12.5 15.9 13.9 16.9 19.9 14.8 17.9

300 292 280 270 270 269 262 262

7.96 8.01 8.10 8.01 7.95 7.99 8.02 7.89

Turbid TURBID TURBID TURBID TURBID SEPT SEPT SEPT CLARIF

BRN BRN BRN LT BRN LT BRN LT BRN LT BRN

— — — — — — — —

— — — — — — — —

11:50 11:55 NOON 12:05 12:10 12:15 12:20 12:25

Samples Obtained / Remarks:

Well Casing Volumes
(gal/ft)

1.25" = 0.077

1.5" = 0.10

2" = 0.164

2.5" = 0.24

3" = 0.37

3.5" = 0.50

4" = 0.65

6" = 1.46

GROUNDWATER SAMPLING DATA SHEET

Project Camp Atterbury Date 6/29/96 Well No. MW7
 Project No. 4162.0204 Sample No. _____
 Field Personnel: C.M.B., MEV

Time

Initial Water Level

2.32'

* Depth of Well

15'

* Length of Water Column

12.68'

* Diameter of Well

2.00'

* One Well Volume

2.08 gal

* Evacuation Method

Whale Pump

10:34

Began Evacuation

Number of Volumes Removed

7

11:14

Began Sampling

11:19

Completed Sampling

* Sampling Method

Whale pump

Field Analysis

* Temperature

14.8 14.1 15.7 15.1 18.7 17.9 16.5

* Conductivity

465u 450u 452u 452u 445u 445u 442u

* pH

7.41 7.61 7.66 7.72 7.87 7.70 7.80

* Turbidity

NES NES LT BRN LT BRN LT BRN LT BRN LT BRN

* Color

NONE NONE NONE NONE NONE NONE NONE

* Odor

* Other

10:43 10:48 10:53 10:58 11:03 11:08 11:13

Samples Obtained / Remarks:

Well Casing Volumes
(gal/ft)

1.25" = 0.077

1.5" = 0.10

2" = 0.164

2.5" = 0.24

3" = 0.37

3.5" = 0.50

4" = 0.65

6" = 1.46

GROUNDWATER SAMPLING DATA SHEET

Project Camp A Herbury Date 6/29/96 Well No. MW#8
 Project No. 4162,0204 Sample No. _____
 Field Personnel: CMB, MEV

Time _____

10:05

10:14
10:15

Initial Water Level artesian
 * Depth of Well 30'
 * Length of Water Column n/a
 * Diameter of Well 2.00"
 * One Well Volume n/a
 * Evacuation Method whale pump

Began Evacuation _____
 Number of Volumes Removed 3
 Began Sampling _____
 Completed Sampling _____
 * Sampling Method Whale Pump

Field Analysis

* Temperature	<u>15.3</u>	<u>14.0</u>	<u>13.8</u>
* Conductivity	<u>252u</u>	<u>250u</u>	<u>241u</u>
* pH	<u>7.87</u>	<u>7.75</u>	<u>7.72</u>
* Turbidity			
* Color			
* Odor			
* Other			

10:03 10:08 10:13
 Samples Obtained / Remarks:

Well Casing Volumes
(gal/ft)

1.25"	= 0.077
1.5"	= 0.10
2"	= 0.164
2.5"	= 0.24
3"	= 0.37
3.5"	= 0.50
4"	= 0.65
6"	= 1.46

PH METER CALIBRATED AT 6.92

GROUNDWATER SAMPLING DATA SHEET

#3

Project
Project No.
Field Personnel:

Camp A Herbury
4162, 0204
CMB

Date 6/29/96
Sample No. _____

Well No. MW9

Time

Initial Water Level
* Depth of Well
* Length of Water Column
* Diameter of Well
* One Well Volume
* Evacuation Method

4.0'
5.64'
4.64'
2"
.76
Whale Pump

Began Evacuation

Number of Volumes Removed

5

Began Sampling

Completed Sampling
* Sampling Method

Whale Pump

Field Analysis

* Temperature
* Conductivity
* pH
* Turbidity
* Color
* Odor
* Other

①	②	③	④	⑤
<u>16.7</u>	<u>16.6</u>	<u>16.4</u>	<u>16.8</u>	<u>16.5</u>
<u>495u</u>	<u>480u</u>	<u>480u</u>	<u>480u</u>	<u>475u</u>
<u>7.62</u>	<u>7.52</u>	<u>7.43</u>	<u>7.38</u>	<u>7.41</u>
<u>MED → LT. BRN</u>	<u>LT. BRN</u>	<u>LT. BRN</u>	<u>LT. BRN</u>	<u>LT. BRN</u>
<u>NONE</u>	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>

Well Casing Volumes
(gal/ft)

1.25" = 0.077
1.5" = 0.10
2" = 0.164
2.5" = 0.24
3" = 0.37
3.5" = 0.50
4" = 0.65
6" = 1.46

18:20 18:25 18:30 18:35 18:40
Samples Obtained / Remarks:

GROUNDWATER SAMPLING DATA SHEET

Project Camp Atherbury Date 28 JUNE 96 Well No. #1 MW 10
 Project No. 1462,0204 Sample No. _____
 Field Personnel: CMB

Time

Initial Water Level
 * Depth of Well
 * Length of Water Column
 * Diameter of Well
 * One Well Volume
 * Evacuation Method

4.12'
19.72'
10.6
2"
1.74
Whale pump

Began Evacuation

Number of Volumes Removed

5

Began Sampling

Completed Sampling
 * Sampling Method

Whale Pump

Field Analysis

* Temperature
 * Conductivity
 * pH
 * Turbidity
 * Color
 * Odor
 * Other

16:45	16:50	16:55	17:00	17:05
14.4 (1)	15.4 (2)	17.2 (3)	16.5 (4)	16.3 (5)
750u	725u	725u	725u	700u
7.31	7.23	7.18	7.20	7.20
LIGHT BROWN	LIGHT BROWN	LIGHT BROWN	LIGHT BROWN	LIGHT BROWN
NONE	NONE	NONE	NONE	NONE

Well Casing Volumes
(gal/ft)

1.25" = 0.077
 1.5" = 0.10
 2" = 0.164
 2.5" = 0.24
 3" = 0.37
 3.5" = 0.50
 4" = 0.65
 6" = 1.46

Samples Obtained / Remarks:

GROUNDWATER SAMPLING DATA SHEET

Project
Project No.
Field Personnel:

Camp Atterbury
4102.0204
CMB

Date 6/29/96
Sample No. _____

Well No. #2 MW11

Time

17:20

Initial Water Level
* Depth of Well
* Length of Water Column
* Diameter of Well
* One Well Volume
* Evacuation Method

3.90'
14.68'
10.78'
2"
1.77 GAL
Whale Pump

17:25

Began Evacuation

Number of Volumes Removed

5

17:52

Began Sampling

17:54

Completed Sampling
* Sampling Method

Whale Pump

Field Analysis

* Temperature
* Conductivity
* pH
* Turbidity
* Color
* Odor
* Other

(1)	(2)	(3)	(4)	(5)
18.2	15.6	15.5	15.1	15.4
600u	600u	600u	600u	600u
7.83	7.64	7.53	7.50	7.44
LIGHT BRN	LIGHT BRN	VERY LIGHT BRN	VERY LT. BRN	VERY LT. BRN
NONE	NONE	NONE	NONE	NONE

Well Casing Volumes
(gal/ft)

1.25" = 0.077
1.5" = 0.10
2" = 0.164
2.5" = 0.24
3" = 0.37
3.5" = 0.50
4" = 0.65
6" = 1.46

17:30 | 17:35 | 17:40 | 17:45 | 17:50
Samples Obtained / Remarks:

GROUNDWATER SAMPLING DATA SHEET

Project
Project No.
Field Personnel:

A Hawk
4162.0205
MEV

Date 8/20/96 Well No. MW12
Sample No. _____

Time

1312

Initial Water Level
* Depth of Well
* Length of Water Column
* Diameter of Well
* One Well Volume
* Evacuation Method

3.66'
11.80
8.14'
2.00"
1.33 gal
Whale pump

15.7
71.76
3.66
8.14

1315

Began Evacuation

6

Number of Volumes Removed

B55

201403

Began Sampling

Completed Sampling

* Sampling Method

Whale Pump

1320

Field Analysis

* Temperature
* Conductivity
* pH
* Turbidity
* Color
* Odor
* Other

1	2	3	4	5	6
24.3	24.3	21.9	21.1	19.8	21.8
625	720	720	800	750	700
7.79	7.12	7.09	7.12	7.22	7.41
semi	semi	semi	slight	v. slight	v. slight
lt brn	lt brn	lt brn	semiclar	semiclar	semiclar
none	none	none	none	none	none
-	-	-	-	-	-

Well Casing Volumes
(gal/ft)

1.25" = 0.077
1.5" = 0.10
2" = 0.164
2.5" = 0.24
3" = 0.37
3.5" = 0.50
4" = 0.65
6" = 1.46

Samples Obtained / Remarks:

Purged dry after 6 well volumes. Will let recharge, then sample.

GROUNDWATER SAMPLING DATA SHEET

Project
Project No.
Field Personnel:

A Herbury
4462.0205
MEN

Date 8/20/96
Well No. MW13
Sample No.

Time

1438

1445

1515

1530

Initial Water Level

* Depth of Well

* Length of Water Column

* Diameter of Well

* One Well Volume

* Evacuation Method

4.27

31.94'

27.67'

2.00"

4.54 gal

Whale pump

Began Evacuation

Number of Volumes Removed

~ 4 1/4

Began Sampling

Completed Sampling

* Sampling Method

Whale Pump

Field Analysis

* Temperature

* Conductivity

* pH

* Turbidity

* Color

* Odor

* Other

	1	2	3	6104	5	6
	15.9	17.10	15.10	17.8		
656	7.07	7.26	7.54	6.00		
71076	6.50	7.00	7.154	7.71		
	turbid	turbid	turbid	turbid		
	brown	brown	brown	black		
	-	-	-	-		
	-	-	-	-		

Well Casing Volumes

(gal/ft)

1.25" = 0.077

1.5" = 0.10

2" = 0.164

2.5" = 0.24

3" = 0.37

3.5" = 0.50

4" = 0.65

6" = 1.46

Samples Obtained / Remarks:

Well purged dry at 3 1/2 volumes. Purged dry again at 4 volumes. Well purged dry again after 4 1/4 volumes. Will let recharge for ~15 min.

GROUNDWATER SAMPLING DATA SHEET

Project Atterbury Date 8/20/96 Well No. MW14
 Project No. 4162.0205 Sample No. _____
 Field Personnel: MEU

Time

1542

Initial Water Level
 * Depth of Well
 * Length of Water Column
 * Diameter of Well
 * One Well Volume
 * Evacuation Method

20.68'
27.46'
6.78'
2.00"
1.11 gal
Whale pump

1552

Began Evacuation
 Number of Volumes Removed

6

1610

Began Sampling

1555

Completed Sampling
 * Sampling Method

Whale Pump

Field Analysis
 * Temperature
 * Conductivity
 * pH
 * Turbidity
 * Color
 * Odor
 * Other

	1	2	3	4	5	6
Temperature	17.8	16.7	15.9	16.2	15.1	15.9
Conductivity	600	550	550	550	520	520
pH	7.15	7.23	7.21	7.34	7.38	7.46
Turbidity	V. turbid	turbid	semi turb.	semi	slight	slight
Color	brown	brown	lt. brown	lt. brown	semi clear	clear
Odor	-	-	-	-	-	-
Other	-	-	-	-	-	-

Well Casing Volumes
 (gal/ft)

1.25" = 0.077
 1.5" = 0.10
 2" = 0.164
 2.5" = 0.24
 3" = 0.37
 3.5" = 0.50
 4" = 0.65
 6" = 1.46

Samples Obtained / Remarks:

Appendix F

F

ANALYTICAL DATA



TRACE

Analytical Laboratories, Inc.

2241 Black Creek Road • Muskegon, MI 49444-2673 • Phone 616-773-5998 • Fax 616-773-6537

Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013-16
REPORT DATE: 09/18/96
EXTRACTION DATE: 09/05/96
ANALYSIS DATE: 09/16/96
ANALYST: tml

CLIENT ID: Proj. #4162.0205

SAMPLE DATE: 08/28/96
SAMPLE RECEIVED: 08/29/96
SAMPLE TYPE: Water
SAMPLER: mev/ade

SAMPLE ID: MW-1-0896

EPA 8150 HERBICIDES

RESULTS (ug/L)

2,4-D	<2
2,4-DB	<2
2,4,5-T	<1
2,4,5-TP (Silvex)	<1
Dicamba	<2
Dalapon	<2
Dichloroprop	<2
Dinoseb	<2
MCPA	<200
MCP	<200

SURROGATE RECOVERY

RESULTS

DCAA	100%
------	------



Analytical Laboratories, Inc.

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Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013-15
AMENDED: 09/18/96
EXTRACTION DATE: 08/27/96
ANALYSIS DATE: 08/29/96
ANALYST: tml

CLIENT ID: Proj. #4162.0205

SAMPLE DATE: 08/20/96
SAMPLE RECEIVED: 08/22&26/96
SAMPLE TYPE: Water
SAMPLER: mev

SAMPLE ID: MW1

EPA 8081 PESTICIDES

RESULTS (ug/L)

a-BHC	<0.05
b-BHC	<0.05
g-BHC (Lindane)	<0.05
d-BHC	<0.05
Heptachlor	<0.05
Aldrin	<0.05
Heptachlor epoxide	<0.05
Chlordane	<0.05
Endosulfan I	<0.05
4,4'-DDE	<0.10
Dieldrin	<0.10
Endrin	<0.10
Endosulfan II	<0.10
4,4'-DDD	<0.10
Endrin aldehyde	<0.10
Endosulfan sulfate	<0.10
4,4'-DDT	<0.10
Methoxychlor	<0.50
Toxaphene	<5.0
Endrin Ketone	<0.10

SURROGATE RECOVERIES

RESULTS

Decachlorobiphenyl	78%
Tetrachloro-m-xylene	46%

Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013-15
AMENDED: 09/18/96
EXTRACTION DATE: 08/23/96
ANALYSIS DATE: 08/28/96
ANALYST: tml

CLIENT ID: Proj. #4162.0205

SAMPLE DATE: 08/20/96
SAMPLE RECEIVED: 08/22&26/9
SAMPLE TYPE: Water
SAMPLER: mev

SAMPLE ID: MW1

EPA 8081 PCBs

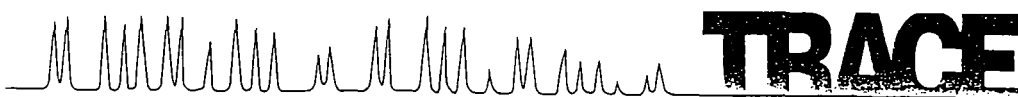
RESULTS (ug/L)

Aroclor 1016	<0.5
Aroclor 1221	<0.5
Aroclor 1232	<0.5
Aroclor 1242	<0.5
Aroclor 1248	<0.5
Aroclor 1254	<0.5
Aroclor 1260	<0.5

SURROGATE RECOVERIES

RESULTS

Decachlorobiphenyl	64%
Tetrachloro-m-xylene	0%



Analytical Laboratories, Inc.

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Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013-15
REPORT DATE: 09/16/96
EXTRACTION DATE: 08/26/96
ANALYSIS DATE: 08/31/96
ANALYST: avl

CLIENT ID: Proj. #4162.0205

SAMPLE DATE: 08/20/96
SAMPLE RECEIVED: 08/22&26/96
SAMPLE TYPE: Water
SAMPLER: mev

SAMPLE ID: MW1

EPA 8270 BASE/NEUTRAL ACID EXTRACTABLES

RESULTS (ug/L)

bis(2-Chloroethyl)ether	<10
2-Chlorophenol	<10
1,3-Dichlorobenzene	<10
1,4-Dichlorobenzene	<10
1,2-Dichlorobenzene	<10
Benzyl alcohol	<10
bis(2-Chloroisopropyl)ether	<2.5
2-Methylphenol	<10
3/4-Methylphenol	<10
n-Nitroso-di-n-propylamine	<2.5
Hexachloroethane	<10
Nitrobenzene	<10
Isophorone	<10
2-Nitrophenol	<10
2,4-Dimethylphenol	<10
bis(2-Chloroethoxy)methane	<10
1,2,4-Trichlorobenzene	<10
2,4-Dichlorophenol	<10
Naphthalene	<10
4-Chloroaniline	<10
Hexachloro-1,3-butadiene	<10
4-Chloro-3-methylphenol	<10
2-Methylnaphthalene	<10
Hexachlorocyclopentadiene	<10
2,4,6-Trichlorophenol	<10
2,4,5-Trichlorophenol	<50
2-Chloronaphthalene	<10
2-Nitroaniline	<50
Dimethylphthalate	<10
Acenaphthylene	<10
2,6-Dinitrotoluene	<10
3-Nitroaniline	<50
Acenaphthene	<10
Dibenzofuran	<10
2,4-Dinitrotoluene	<10

CLIENT: Montgomery Watson America Inc.
TRACE ID: Q013-15

page 2

EPA 8270 BASE/NEUTRAL ACID EXTRACTABLES, cont.

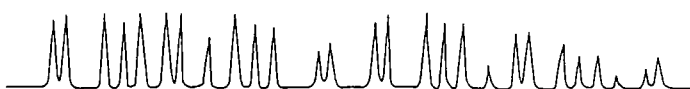
RESULTS (ug/L)

4-Nitrophenol	<50
2,4-Dinitrophenol	<50
Diethylphthalate	<10
Fluorene	<10
4-Chlorophenyl-phenylether	<10
4-Nitroaniline	<50
4,6-Dinitro-2-methylphenol	<50
n-Nitrosodiphenylamine	<10
4-Bromophenyl-phenylether	<10
Hexachlorobenzene	<10
Pentachlorophenol	<50
Phenanthrene	<10
Anthracene	<10
Carbazole	<10
Di-n-butylphthalate	<10
Fluoranthene	<10
Pyrene	<10
Butylbenzylphthalate	<10
Benzo(a)anthracene	<10
Chrysene	<10
3,3'-Dichlorobenzidine	<20
bis(2-Ethylhexyl)phthalate	<10
Di-n-octylphthalate	<10
Benzo(b)fluoranthene	<10
Benzo(k)fluoranthene	<10
Benzo(a)pyrene	<10
Indeno(1,2,3-cd)pyrene	<10
Dibenzo(a,h)anthracene	<10
Benzo(g,h,i)perylene	<10

SURROGATE RECOVERIES

RESULTS

2-Fluorophenol	45%
Phenol-d5	29%
Nitrobenzene-d5	65%
2-Fluorobiphenyl	64%
2,4,6-Tribromophenol	81%
p-Terphenyl-d14	94%



TRACE

Analytical Laboratories, Inc.

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Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013-15
REPORT DATE: 09/16/96
EXTRACTION DATE: 08/27/96
ANALYSIS DATE: 08/29/96
ANALYST: tml

CLIENT ID: Proj. #4162.0205

SAMPLE DATE: 08/20/96
SAMPLE RECEIVED: 08/22&26/96
SAMPLE TYPE: Water
SAMPLER: mev

SAMPLE ID: MW1

EPA 8081 PESTICIDES

RESULTS (ug/L)

a-BHC	<0.01
b-BHC	<0.01
g-BHC (Lindane)	<0.01
d-BHC	<0.01
Heptachlor	<0.01
Aldrin	<0.01
Heptachlor epoxide	<0.01
Chlordane	<0.05
Endosulfan I	<0.01
4,4'-DDE	<0.01
Dieldrin	<0.01
Endrin	<0.01
Endosulfan II	<0.01
4,4'-DDD	<0.01
Endrin aldehyde	<0.01
Endosulfan sulfate	<0.01
4,4'-DDT	<0.01
Methoxychlor	<0.01
Toxaphene	<0.5
Endrin Ketone	<0.02

SURROGATE RECOVERIES

RESULTS

Decachlorobiphenyl	78%
Tetrachloro-m-xylene	46%

Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013-15
REPORT DATE: 09/16/96
EXTRACTION DATE: 08/23/96
ANALYSIS DATE: 08/28/96
ANALYST: tml

CLIENT ID: Proj. #4162.0205

SAMPLE DATE: 08/20/96
SAMPLE RECEIVED: 08/22&26/9
SAMPLE TYPE: Water
SAMPLER: mev

SAMPLE ID: MW1

EPA 8081 PCBs

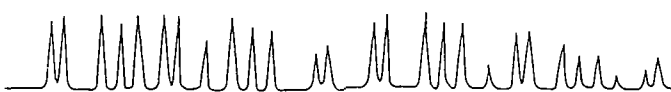
RESULTS (ug/L)

Aroclor 1016	<0.2
Aroclor 1221	<0.2
Aroclor 1232	<0.4
Aroclor 1242	<0.2
Aroclor 1248	<0.2
Aroclor 1254	<0.2
Aroclor 1260	<0.2

SURROGATE RECOVERIES

RESULTS

Decachlorobiphenyl	64%
Tetrachloro-m-xylene	0%



TRACE

Analytical Laboratories, Inc.

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Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013
REPORT DATE: 09/16/96
ANALYSIS DATE: 09/05/96
ANALYST: mg

CLIENT ID: Proj. #4162.0205

SAMPLE RECEIVED: 08/29/96
SAMPLE TYPE: Water
SAMPLER: mev/ade

TRACE SAMPLE NO.	SAMPLE DATE	SAMPLE ID	TOTAL CYANIDE (mg/L)	METHOD NUMBERS
16	08/28/96	MW-1-0896 Landfill Area	<0.005	EPA 335.2

TRACE

Analytical Laboratories, Inc.

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Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013-15
REPORT DATE: 09/16/96
ANALYSIS DATE: 08/28/96
ANALYST: cc/mg

CLIENT ID: Proj. #4162.0205

SAMPLE DATE: 08/20/96
SAMPLE RECEIVED: 08/22&26/96
SAMPLE TYPE: Water
SAMPLER: mev

SAMPLE ID: MW1

PARAMETER	RESULT	METHOD NUMBER
Total Phosphorus	1.0 mg/L	EPA 365.2

Mr. Doug Barber
Montgomery Watson America Inc.
41551 Eleven Mile Road
Novi, MI 48375

TRACE ID: Q013-15
REPORT DATE: 09/16/96
ANALYST: dc/vr/dj

CLIENT ID: Proj. #4162.0205

SAMPLE DATE: 08/20/96
SAMPLE RECEIVED: 08/22&26/9
SAMPLE TYPE: Water
SAMPLER: mev

SAMPLE ID: MW1

DISSOLVED METALS	RESULTS (ug/L)	ANALYZED	METHOD NUMBERS
Aluminum	<120	08/28/96	EPA 6010A
Barium	<100	08/27/96	EPA 6010A
Beryllium	<5.0	08/28/96	EPA 6010A
Calcium	80,000	08/28/96	EPA 6010A
Cobalt	<50	08/28/96	EPA 6010A
Chromium	<50	08/27/96	EPA 6010A
Copper	23	08/27/96	EPA 6010A
Iron	<40	08/28/96	EPA 6010A
Potassium	<500	08/28/96	EPA 6010A
Magnesium	24,000	08/28/96	EPA 6010A
Manganese	<10	08/27/96	EPA 6010A
Sodium	8,100	08/28/96	EPA 6010A
Nickel	<40	08/27/96	EPA 6010A
Vanadium	<200	08/28/96	EPA 6010A
Zinc	<20	08/27/96	EPA 6010A
Silver	<10	08/29/96	EPA 6010A
Arsenic	<2.0	08/27/96	EPA 7060A
Cadmium	<5.0	08/29/96	EPA 7131A
Lead	<3.0	08/27/96	EPA 7421
Antimony	<60	09/11/96	EPA 7041
Selenium	<4.0	09/10/96	EPA 7740
Thallium	<100	09/10/96	EPA 7841
Mercury	<0.20	08/28/96	EPA 7470A

CHAIN-OF-CUSTODY RECORD


Q 013

Page 1 of 1

PLEASE COMPLETE STEPS 1 THRU 3. TRACE PERSONNEL WILL COMPLETE SECTIONS SHADED BLUE.

Client Name: <u>Montgomery Watson</u>	
Contact Person: <u>Doug Barber</u>	
Mailing Address: <u>41551 11 Mile Rd.</u>	
City, State, Zip Code: <u>Novi MI 48375</u>	
Phone: <u>(810) 344-0205</u>	Fax: <u>(810) 344-0217</u>
Client Job Name/No.: <u>4162.0205</u>	
Trace Quote No.:	Purchase Order No.:

Logged By: NS.

Checked By: 

Sample Condition Upon Receipt: Acceptable Other (Specify below)

Cooler Temp. (°C):

pH Checked: Yes No

Volatiles Preserved: Yes No Metals FF: Yes No Pres: Yes No

Sampled By: Mark Van Doren

ANALYSIS REQUESTED

Regulatory Requirements

MERA TMDLs ☐
 RCRA ☐
 NPDES ☐
 Drinking Water ☐
 Other: ☐

Turnaround Requirements

Standard ☐

* 5 Day (RUSH) ☐

* 2-4 Day (RUSH) ☐

* 24 Hour (RUSH) ☐

* Requires prior approval

Matrix Key

S = Soil SL = Sludge
W = Water A = Air
O = Oil X = Other

TRACE NO.	DATE TAKEN	TIME TAKEN	METALS FIELD FILTERED	VOLATILES PRESERVED	CLIENT SAMPLE ID	MATRIX	NUMBER OF CONTAINERS
01	5/20/06	0800	N/A	N/A	WR-SS2-000	S	2
02		↓			WR-SS3-000	S	2
03		↓			WR-SS5-001	S	2
04		1000 0100			IA-SD1-000	S	1
05		↓			IA-SD2-000	S	1
06		↓			IA-SD3-000	S	1
07		↓			IA-SD4-000	S	1
08		↓	↓		IA-SD5-000	S	1
09		1400	Yes		MW12-0896	W	1
10	↓		Yes	↓	MW12-Dup-0896	W	1

REMARKS

1 Voc's Sample
free per Mary
QULS 4.

Presbyterian Health Services

Item #	RELEASED BY	RECEIVED BY	DATE	TIME	Item #	RELEASED BY	RECEIVED BY	DATE	TIME
1)	MEV				01-10	2) Fed Ex	M. Smiech	8/22/96	12:30
3)					4)				

executing this agreement, the Client acknowledges acceptance of the terms of the agreement as listed on the reverse side.



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ANALYTICAL SERVICES AUTHORIZATION CHAIN-OF-CUSTODY RECORD

TRACE NO.

Q013

Page 2 of 2

PLEASE COMPLETE STEPS 1 THRU 3. TRACE PERSONNEL WILL COMPLETE SECTIONS SHADED BLUE.

STEP 1 Report Results To	Client Name: <u>Montgomery Watson</u>					For Use by TRACE Personnel Only	Logged By: <u>RS</u>		Checked By: <u>MR</u>																				
	Contact Person: <u>Doug Barber</u>						Sample Condition Upon Receipt: Acceptable Other (Specify below)																						
	Mailing Address: <u>41551 11 Mile Rd.</u>																												
	City, State, Zip Code: <u>Novi MI 48375</u>																												
	Phone: <u>(810) 344-0205</u> Fax: <u>(810) 344-0217</u>						Cooler Temp. (°C): <u>9</u> pH Checked: Yes No																						
	Client Job Name/No.: <u>4162.0205</u>						Volatiles Preserved: Yes No Metals FF: Yes No Pres: Yes No																						
	Trace Quote No.: Purchase Order No.:																												
Sampled By: <u>Mark Van Doren</u>					ANALYSIS REQUESTED																								
STEP 2 Sample Identification / Request for Analytical Services	Regulatory Requirements			Turnaround Requirements			Matrix Key			<div>TRACE NO. DATE TAKEN TIME TAKEN METALS FIELD FILTERED VOLATILES PRESERVED CLIENT SAMPLE ID MATRIX NUMBER OF CONTAINERS</div> <div>REMARKS</div> <div>Possible Health Hazard</div>																			
	MERA TMDLs <input type="checkbox"/>			Standard <input type="checkbox"/>			S = Soil SL = Sludge																						
	RCRA <input type="checkbox"/>			* 5 Day (RUSH) <input type="checkbox"/>			W = Water A = Air																						
	NPDES <input type="checkbox"/>			* 2-4 Day (RUSH) <input type="checkbox"/>			O = Oil X = Other																						
	Drinking Water <input type="checkbox"/>			* 24 Hour (RUSH) <input type="checkbox"/>																									
	Other: <input type="checkbox"/>			* Requires prior approval <input type="checkbox"/>																									
	TRACE NO.	DATE TAKEN	TIME TAKEN	METALS FIELD FILTERED	VOLATILES PRESERVED	CLIENT SAMPLE ID	MATRIX	NUMBER OF CONTAINERS																					
	11	8/20/06	1530	Yes	M	MW13-0896	W	1	X																				
	12		1530	Yes		MW13-Dup-0896	W	1	X																				
	13					MW14-0896	MW	3	X																				
	14					MW14-Dup-0896	W	1	X																				
STEP 3 Chain-of-Custody	Item #	RELEASED BY	RECEIVED BY	DATE	TIME	Item #	RELEASED BY	RECEIVED BY	DATE	TIME																			
	1)	MEV				114	2) Fed EX.	M. Suresh	8/22/06	12:00																			
	3)						4)																						

ANALYTICAL SERVICES AUTHORIZATION CHAIN-OF-CUSTODY RECORD

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TRACE 1 OF 3

Q 01's
Page 3 of 3

PLEASE COMPLETE STEPS 1 THRU 3. TRACE PERSONNEL WILL COMPLETE SECTIONS SHADED BLUE.

Report Results To	Client Name:	Montgomery Watson			For Use by TRACE Personnel Only	Logged By:	MS			Checked By:	[Signature]			
	Contact Person:	Dorcy Barker				Sample Condition Upon Receipt:	Acceptable			Other	(Specify below)			
	Mailing Address:	41551 11 Mile Rd												
	City, State, Zip Code:	Novi MI 48375												
	Phone:	(810) 344-0205				Fax:			(810) 344-0217					
	Client Job Name/No.:	4162.0205												
Trace Quote No.:					Purchase Order No.:									
Sampled By:					Monk Van Dusen					ANALYSIS REQUESTED				

Sample Identification / Request for Analytical Services	Regulatory Requirements					Turnaround Requirements					Matrix Key					ANALYSIS REQUESTED										Possible Health Hazard												
	MERA TMDLs <input type="checkbox"/> RCRA <input type="checkbox"/> NPDES <input type="checkbox"/> Drinking Water <input type="checkbox"/> Other: <input type="checkbox"/>					Standard <input type="checkbox"/> * 5 Day (RUSH) <input type="checkbox"/> * 2-4 Day (RUSH) <input type="checkbox"/> * 24 Hour (RUSH) <input type="checkbox"/> * Requires prior approval					S = Soil SL = Sludge W = Water A = Air O = Oil X = Other																											
	TRACE NO.	DATE TAKEN	TIME TAKEN	METALS FIELD FILTERED	VOLATILES PRESERVED	CLIENT SAMPLE ID										MATRIX	NUMBER OF CONTAINERS	REMARKS																				
	15	8/20/96	1900	NA	NA	MW1										W	1	<div style="position: relative; height: 100px;"> <div style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; background: linear-gradient(to top right, transparent 49%, #ccc 49%, #ccc 51%, transparent 51%); background-size: 10px 10px;"></div> <div style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; opacity: 0.5; font-size: 20px; transform: rotate(-45deg); pointer-events: none;"> VOC's SVOC's OC Pest./P.B. Herb./Insect. OP Pest. Metals Phosphorus </div> </div>																				

Chain-of-Custody	Item #	RELEASED BY	RECEIVED BY	DATE	TIME	Item #	RELEASED BY	RECEIVED BY	DATE	TIME
	1)	MBV				15	2) Fed Ex.	M. Smeech	8/22/96	12:00
	3)					4)				

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MONTGOMERY WATSON

CHAIN OF CUSTODY RECORD

SPECIAL INSTRUCTIONS:

TURN JND

- ☐ PECFA
☐ WILUST
☐ ACT 307
☐ REPORT DRY WT
☐ OTHER:

- ☒ 2 WEEKS (standard)
☐ 1 WEEK
☐ 3 DAYS
☐ 1 DAY

PROJECT NAME: CAMP ATTERBURY			PROJECT #: 4162.0205			<div style="text-align: right; font-size: 2em; font-family: cursive;">JPD</div>																							
CITY: EDINBURGH			STATE: INDIANA															<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">NO. OF CONTAINERS</div> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 2px;">SVOL</div> <div style="border: 1px solid black; padding: 2px;">POST / PUD</div> <div style="border: 1px solid black; padding: 2px;">OP POST</div> <div style="border: 1px solid black; padding: 2px;">OL POST</div> <div style="border: 1px solid black; padding: 2px;">CML. HOOD</div> <div style="border: 1px solid black; padding: 2px;">CYANIDE</div> </div> </div>											
SAMPLER(S): MEV / AOE																													
COLLECTION DATE	COLLECTION TIME	GRAB / COMP	SAMPLE ID			NO. OF CONTAINERS	<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">NO. OF CONTAINERS</div> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 2px;">SVOL</div> <div style="border: 1px solid black; padding: 2px;">POST / PUD</div> <div style="border: 1px solid black; padding: 2px;">OP POST</div> <div style="border: 1px solid black; padding: 2px;">OL POST</div> <div style="border: 1px solid black; padding: 2px;">CML. HOOD</div> <div style="border: 1px solid black; padding: 2px;">CYANIDE</div> </div> </div>						LAB USE ONLY																
													MATRIX		LAB NO.														
8/28	1:00 P	G	MW-1-0896 LAND-ILL AREA										6	X	X	X	X	X	(X)	ALL UNFILTERED									
SPECIAL INSTRUCTIONS:						RECEIVED: <input checked="" type="checkbox"/> INTACT <input type="checkbox"/> ON ICE TEMP _____ OF _____						PROJ. MGR.: Dave B. BAKER																	

RECEIVED: ☒ INTACT ☐ ON ICE TEMP 5°C OF

PROJ. MGR.:	Dave B. Brown
-------------	---------------

~~Amber broken~~

SIGNATURE	PRINT NAME	COMPANY / TITLE	DATE	TIME
RELINQUISHED BY: <i>[Signature]</i>	BARON D. ETNYRE	Montgomery Watson	8/22	
RECEIVED BY: <i>[Signature]</i>				
RELINQUISHED BY: <i>[Signature]</i>				
RECEIVED BY: <i>[Signature]</i>	K. Gardner	Trace Analytical	8/29	1:30

C-O-C No. 112943

NAME OF COURIER: FIDEX
AIRBILL NUMBER: 9939082215

ANALYTICAL SERVICES AUTHORIZATION CHAIN-OF-CUSTODY RECORD

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TRACE # 0.3

9/16

Page 4 of 4

PLEASE COMPLETE STEPS 1 THRU 3. TRACE PERSONNEL WILL COMPLETE SECTIONS SHADED BLUE.

STEP 1 Report Results To	Client Information										For Use by TRACE Personnel Only	Analysis Requested																		
	Client Name: <u>Montgomery Watson</u>											Logged By: <u>RJ</u> Checked By:																		
	Contact Person: <u>Doug Barber</u>											Sample Condition Upon Receipt: Acceptable Other (Specify below)																		
	Mailing Address: <u>41551 11 Mile Rd.</u>																													
	City, State, Zip Code: <u>Novi MI 48375</u>																													
	Phone: <u>(810) 344-0205</u> Fax: <u>(810) 344-0217</u>											Cooler Temp. (°C): <u>23°C</u> pH Checked: Yes No																		
	Client Job Name/No.: <u>4162.0205</u>											Volatiles Preserved: Yes No Metals FF: Yes No Pres: Yes No																		
Trace Quote No.: Purchase Order No.:																														
Sampled By: <u>Mark Van Doren</u>																														
STEP 2 Sample Identification / Request for Analytical Services	<div>Regulatory Requirements</div> <div>MERA TMDLs <input type="checkbox"/></div> <div>RCRA <input type="checkbox"/></div> <div>NPDES <input type="checkbox"/></div> <div>Drinking Water <input type="checkbox"/></div> <div>Other: <input type="checkbox"/></div>										<div>Turnaround Requirements</div> <div>Standard <input type="checkbox"/></div> <div>* 5 Day (RUSH) <input type="checkbox"/></div> <div>* 2-4 Day (RUSH) <input type="checkbox"/></div> <div>* 24 Hour (RUSH) <input type="checkbox"/></div> <div>* Requires prior approval</div>										<div>Matrix Key</div> <div>S = Soil SL = Sludge</div> <div>W = Water A = Air</div> <div>O = Oil X = Other</div>									
	TRACE NO.	DATE TAKEN	TIME TAKEN	METALS FIELD FILTERED	VOLATILES PRESERVED	CLIENT SAMPLE ID	MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUESTED										Possible Health Hazard											
	15	8/16/96	1900	Y		MW 2	W6		<div>UOX's</div> <div>SVOC's</div> <div>PCP's</div> <div>Chlor. herb.</div> <div>OP Pest.</div> <div>Metals</div> <div>Phosphorus</div>																					
STEP 3 Chain-of-Custody										STEP 3 Chain-of-Custody																				
Item #	RELEASED BY		RECEIVED BY		DATE	TIME	Item #	RELEASED BY		RECEIVED BY		DATE	TIME																	
1)	MBW		Jed Ex				2)	Jed Ex		K. Gardner		8-26-96	45P																	
3)							4)																							

In executing this agreement, the Client acknowledges acceptance of the terms of the agreement as listed on the reverse side.